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AGRICULTURAL AND PASTORAL CONFERENCE HELD IN ROCKHAMPTON, 11th, 12th, 13th MAY, 1898.

Agricultural and Pastoral Conference.

AT ROCKHAMPTON, 11TH, 12TH, AND 13TH OF MAY, 1898.

AGRICULTURAL SECTION.

AN agricultural conference, organised by the Agricultural Department and similar to the one held at Gatton last year, was held at the School of Arts, Rockhampton, on the 11th, 12th, and 13th of May, and was attended by delegates from the majority of the leading agricultural societies of the colony. A representative pastoral conference was also held at the same time, its proceedings being recorded in this Report. The following were the delegates to the agricultural section :—

Chairman : Hon. J. V. Chataway, M.L.A., Secretary for Agriculture.

Agricultural and Pastoral Society of Southern Queensland, Beenleigh—Jas. Savage (Beenleigh) and R. McCready (Beenleigh).

Logan Farming and Industrial Association, Loganholme—Fred. W. Peek (Loganholme) and F. C. Krause (Mount Cotton).

South Queensland and Border Pastoral and Agricultural Society, Nerang—S. Stephens (Nerang) and E. Hicks (Southport).

Wellington Point Agricultural, Horticultural, and Industrial Association, Wellington Point—J. H. Davidson (Wellington Point) and K. Ziegenfusz (Wellington Point). Ipswich and West Moreton Agricultural and Horticultural Society, Ipswich—H. E. Wyman (Ipswich) and P. W. Cameron (Ipswich). Lockyer Agricultural and Industrial Society, Laidley—M. O'Keefe (Blenheim) and P. Dwyer (Tenthill, Gatton). Rosewood Farmers' Club, Rosewood—Jos. Hudson (Rosewood) and T. E. Coulson (Rosewood). Royal Agricultural Society of Queensland, Toowoomba—R. W. Scholefield (Toowoomba) and J. G. Palethorpe (Toowoomba). Drayton and Toowoomba Agricultural and Horticultural Society, Toowoomba—W. R. Robinson (Toowoomba) and F. Hooper (Toowoomba). Eastern Downs Horticultural and Agricultural Association, Warwick—W. D. Lamb (Yangan) and P. Hagenbach (Warwick). Central Downs Agricultural and Horticultural Association, Allora—W. Deacon (Allora) and John Gilmore (Allora). Wallumbilla Farmers' Progress Association, Wallumbilla—W. R. Twine (Wallumbilla). Gympie Agricultural, Mining, and Pastoral Society, Gympie—E. Bytheway (Gympie) and M. Mellor (Gympie). Wide Bay and Burnett Pastoral and Agricultural Society, Maryborough—W. A. A. Bates (Boompa) and J. E. Noakes (Maryborough). Pialba Farmers' Association, Pialba—T. A. Bromiley (The Mountain, Pialba) and H. Jorgensen (Pialba). North Isis Cane-growers' Association, North Isis—A. Walker and W. J. Young (North Isis). Isis Agricultural Association, Childers—T. H. Wells (Childers) and H. Epps (Childers). Kolan Canegrowers' and Farmers' Association, Kolan—C. Marks (North Kolan) and S. A. Lindeman (Bundaberg). Rockhampton Agricultural Society, Rockhampton—A. Macfarlane (Rockhampton) and E. Horton (Rockhampton). Central Queensland Farmers' and Selectors' Association, Rockhampton—T. Whiteley (Coowonga) and Jas. Davies (Malchi). Bowen Pastoral, Agricultural, and Mining Association, Bowen—G. F. Sandrock (Rockhampton). Pioneer River Farmers' Association, Mackay—E. Denman (Etowie, Mackay) and E. Swayne (6-Mile, Mackay). Herbert River Farmers' League, Halifax—Captain A. Henry (Victoria, Lucinda Point).

Officers of the Department of Agriculture : P. McLean (Under Secretary), A. H. Benson (Fruit Expert and Director of State Farms), and John Mahon (Instructor in Dairying).

The opening session of the Conference was also attended by the delegates to the Pastoral Section.

FIRST SESSION.

WEDNESDAY, 11TH MAY, 1898.

THE CHAIRMAN'S ADDRESS.

The Hon. J. V. CHATAWAY: Gentlemen,—This is not the first conference of this nature that has been held in Rockhampton, but it is undoubtedly by far the most important and the most largely attended. Some years ago a conference was held here under the auspices of the Department of Agriculture, but, unlike the present gathering, it was purely agricultural in its objects and purely local in its delegates. The value of conferences has long been recognised by the Department of Agriculture, but, while local meetings have been found possible, considerable difficulty has been experienced in gathering together delegates from the various parts of the colony. They enable them to compare notes to see where improvements can be effected and economies established; to hear of ideas which, while new in one part of the colony, are old in another, and which are thus distributed and put into practice to the benefit of every producer. Further than that, they tend to enforce the idea, an absolutely true one, of the unity of interests in the various parts of Queensland. This should never be lost sight of. The farmer in the South may grow wheat, maize, or potatoes, and the planter in the North, sugar-cane or coffee, but the interests of both farmer and planter are identical in the end, and the driving home of this truth of the unity of interests of all the agriculturists of Queensland is probably the most important gain in such conferences as the present. And it is the same in the pastoral section. Pastoralists from one end of the colony to the other have the same objects in view. They are all anxious to lessen the cost of production and find new markets for their stock. The papers that are read at these gatherings are like the leading articles of a newspaper—the views of one man. But they are the views of a man who believes what he says, and who has given considerable thought and attention to the matter he is dealing with. The discussions, however, which follow these papers are the thoughts of twenty or thirty men, and it is this which so enhances the value of the papers. Again, the facts and opinions supplied are kept as a permanent record, so those furnished, say, in 1898 will doubtless be of interest ten years hence. Last year a conference—a purely agricultural one—was held at the Agricultural College, Gatton. The late Minister for Agriculture was chairman, and, although the first of its kind, it was extremely successful. In fact, considering we are now holding our sittings in a city, and not in a comparatively isolated college, I doubt whether we will be able to look forward to the same success, in some respects, here. The success of the Gatton conference was not so much due to the papers or discussions as to the way the delegates were thrown together from early morning till late at night. They were not scattered about a large town as you are somewhat, but were always in constant contact with each other. I was an onlooker at that conference from the start to the close, and was surprised at the modified views of many of the representatives at its conclusion. A delegate perhaps came from the North, a man perhaps who had never before met the successful wheat-grower of the Downs, but about whom nevertheless he held certain views. The same with the wheat-grower. He had pictured the planter as an individual rolling in riches, and subsidised, perhaps, by the kindly State. He discovered, however, that it was not as he thought. The North discovered and the South discovered that each had his troubles, and strangely enough they found that the troubles of both were almost identical.

But this year we are not at Gatton; we have come far North enough to see in the heavens the constellation of the Plough. I hope this will be a happy augury that some good to the agriculturists of the colony will be evolved out of our labours. Perhaps I may not be out of place in alluding to the enormous spread of agriculture in Queensland of late years, and I trust the spirit of this

expansion will fall upon that part of the colony in which we are now assembled. Hitherto there has not been such a large spread of the industry in the Central district, but in the North and South there has certainly been a very marked increase in agriculture. With regard to the product peculiar to the North, sugar, the output of the colony last year was 100,000 tons. This year the increase will probably be not less than 50 per cent. In spite of the difficulty and expense of putting new land under such a crop as cane, and various adverse climatic conditions, Queensland's cane crop this year will yield 150,000 tons of sugar. But to go to other matters—matters which go, as sugar does, into every household. There is butter; and in this branch of the farming industry I think I may fairly claim that the Agricultural Department has been of considerable assistance. When I first came into active politics, in 1893—of course, I claim no credit, but am simply stating a fact—the importations of butter into the colony exceeded the exports by 250,000 lb.

Last year the balance had entirely changed, and we exported 190,000 lb. more than we imported. This year we may hope that our exports of butter will exceed our imports by fully 1,000,000 lb. The day I left Brisbane, Saturday week, I was informed that 2,000 boxes of butter had just been sold to go to Melbourne. This will give some idea of the spread of agriculture in one section. The same thing has happened in regard to cheese. In 1893 the imports exceeded the exports by 350,000 lb., but in 1897, although the tide had not yet turned, the difference had been reduced to 14,500 lb., and I believe that before another couple of years have passed our cheese will take its place alongside of our butter and meat in the London market. There is another valuable industry which has shown a similar expansion, although I was sorry not to have seen it represented on the show ground to-day, and that is pig-raising. A gentleman reminded me to-day that the first bulletin issued by the Department of Agriculture was on pig-raising; and if the Department put this subject intentionally in the forefront as a type of the kind of information they were desirous of spreading, they could not have chosen a better. In 1893 we imported 6,700 lb. of bacon more than we exported, but in four years the figures were 681,000 lb. in favour of the exports. I know of one Queensland firm alone that is exporting to the southern colonies 1,200 sides and 800 flitches of bacon per month. It is Queensland that is mainly keeping Western Australia in pig products. It was a Queensland factory that beat all others at the late Sydney show. In fact, I think both Queensland bacon and butter will very shortly occupy the most prominent place in the markets of Australia. Exactly the same class of figures applies to hams, lard, and similar products, but I shall not weary you with further statistics.

While the agricultural industry is flourishing, it may be said that there is considerable hope that the tide has turned for the pastoralists. The large and constantly increasing demand for beef extract has now established a minimum price for stock which is considerably in excess of boiling rates, and the number of works that are now being fitted with extract machinery will be sufficient, I hope, to absorb all our surplus meat. That is one hopeful sign. But I am hoping that the present wasteful system under which we now export annually a quarter of a million head of cattle into New South Wales will eventually be abolished. At present our stock leave our stations half or three-quarter fat. On the way to market, however, they lose all that fat, and start again in New South Wales as really store stock. That waste is a loss to the industry which in some way or other ought to be saved. New South Wales at the present time is dealing with probably the most valuable part of the bullock. We get no adequate return for the hides, the horns, the hoofs, the tallow, and all the other by-products we send over on the hoof, but I am very hopeful that these losses will be stopped. I am hoping that a trade in chilled meat will be established with the other colonies. Even though temporary loss and disarrangement of trade may result from the quarantine line just established by New South Wales along our border, I am convinced that that action will be of the very greatest benefit in compelling us to do our

own business in a way that will yield the greatest profit to our own producers. I need not elaborate the subject, as it is one that those of the pastoral section here present understand far better than I do. But in the meantime I may state that there are lying disused, in Brisbane, twelve refrigerating cars, and I am informed that the railway authorities would put no obstacle in the way, indeed would give every encouragement, for the use of these cars in order to take chilled meat away from north of the quarantine line into the metropolis. I only just throw out this hint to the pastoral section, as it may be worth considering. In shipping meat by these cars the preliminary treatment would be simpler and less expensive than in preparing it for a sea voyage of several days. I have only just seen the programme of the pastoral section of this Conference, but I would have liked to have seen on it one of the most important questions of the present day—important both to the agriculturist, as he is generally interested in stock also, and to the pastoralist—and that is, how to increase the carrying capacity of the country, how to improve the natural pastures and make them go further. We know it is being partially done in the West by the grazing-farm system, and in New South Wales new grasses are being laid down which are considerably increasing the carrying capacity of the country. There are many gentlemen in Queensland who have already gone to considerable trouble and expense in connection with small though costly experiments in the laying down of new grasses. None of them, perhaps, have had the same success as Mr. Walker, of Tenterfield, who has partially restocked the Tenterfield Run with new grasses, so that it is now carrying sheep where fluke and footrot formerly rendered it impossible. I again throw this out as a hint to the pastoral section, because in this direction most valuable information could be given to the Department of Agriculture. The duties of the Department have, it seems to me, certain clearly defined limits, but amongst these duties are certainly the collection of information that cannot be collected by the ordinary individual, the inauguration of experiments that cannot be carried out by the ordinary individual, and the distribution throughout the colony of the information collected and of the results of the experiments. I shall not detain you longer, gentlemen. You have had a very heavy day at the show, and I shall conclude by thanking you for the very kind reception you have accorded me. (Applause.)

Mr. P. McLEAN, after explaining the order of the business for the following day, moved the following resolutions, both of which were unanimously adopted:—

1. That delegates shall not speak more than once on each subject, and not longer than five minutes; the reader of a paper to be allowed ten minutes to reply.

2. That the following constitute a Committee on Resolutions:—F. W. Peek, W. R. Robinson, W. Deacon, A. Walker, and E. Swayne; Mr. Swayne to be convener.

Mr. E. HORTON, on behalf of the Rockhampton Agricultural Society, extended a cordial welcome to the delegates to Central Queensland.

Mr. T. S. BEATTY (St. Lawrence) suggested that if similar gatherings were held in the future it would be an advantage to have the papers to be placed before the meetings printed and circulated among the delegates.

The CHAIRMAN, on behalf of the other delegates, having thanked Mr. Horton for his welcome to Rockhampton, then adjourned the meeting till the following morning.

SECOND SESSION.

THURSDAY, 12TH MAY, 1898, 9.30 A.M.

The Hon. J. V. CHATAWAY having taken the chair, the following three papers were read by their writers:—

QUEENSLAND MARKETS FOR AGRICULTURAL PRODUCE.

[By M. O'KEEFE, Bleinheim, Laidley.]

The existing system of markets for agricultural produce has long been a question of much dissatisfaction to Queensland agriculturists. Especially is this the case as

regards the Roma-street markets, Brisbane. These markets were supposed to be established principally for the convenience of farmers; but they are so manipulated by the auctioneers and dealers that, instead of proving a boon, they are generally regarded as a curse to the agricultural industry. Farmers are to be found everywhere in the humiliating position of having no say in the making of prices for their own farm produce. The antics played with the markets by the produce auctioneer and dealer overwhelm one's sense of justice and destroy confidence between buyer and seller. Take, for example, what may be called the unnatural and unwarrantable fluctuations in the prices of produce which frequently occur. I am not now referring to fluctuations caused by the natural law of supply and demand, which everyone knows must always remain the chief factor in regulating prices, but to fluctuations caused by the trickery of the middleman to his own advantage and to the great disadvantage of both producer and consumer. Anyone having business at the Roma-street markets will know what I mean when they call to mind the great rises in prices of farm produce, often to an unwarrantable extent, but which fall again, in a day or two, even lower than before. This invariably has the effect apparently desired by the produce auctioneer and dealer. That is, it causes farmers to start forward large quantities of produce in the hope of catching the big price; but their calculations are doomed, and the usual result follows. Farmers are discouraged and again hold back, expecting prices to recover and harden. Once more prices take a sudden jump, giving the dealer time to get stocks off at a good figure, but not sufficient time for the farmer to get there at all. In this fitful manner have the produce markets in Queensland been conducted until, as I have said, confidence between buyer and seller no longer exists. It should not be necessary to occupy too much space in quoting reasons proving the unsatisfactory system of Queensland produce markets as at present existing. Every farmer has his own bitter experience. But supposing that no charge of unfairness could be brought against the present system, there still remains the necessity of bringing the producer and consumer into closer relationship. How to achieve this object has long troubled the minds of all who have the true interests of agriculture at heart or desire the welfare of the general community. In these times of low prices and general depression it must be apparent that agricultural produce can no longer support the huge army of middlemen that hangs round the neck of the agricultural industry like the proverbial millstone. The producer and the consumer suffer alike by the connection. The time has arrived when farmers should combine to establish markets on such a basis as to bring the producer and consumer face to face, and as far as possible do away with the middleman. The present Conference should be the proper time to initiate matters in this connection, and, with that object in view, I would offer the following suggestion as, in my opinion, calculated to meet the case. In making the suggestion, however, I confine myself to the Roma-street markets, and desire to leave to representatives of other towns and districts, who may know more about their respective requirements than I do, to make what suggestions they may deem desirable. I would suggest that the Roma-street markets be placed under the control of the Department of Agriculture, with a departmental auctioneer, and an efficient staff of assistants; the whole of the salaries to be paid by the Department; the Department, however, in order to repay itself, to have the power of charging a commission on all sales so that not one shilling expense shall fall upon the country. The duty of such officer should be to act as general agent between buyer and seller, to endeavour to find markets for all surplus produce; to purchase supplies, &c., on account of all farmers ordering same. In short, to transact all legitimate business as farmers' agent. By this means the consumers of Brisbane will be able to attend the markets and make their purchases direct from the producer—a matter of impossibility now, as I could easily prove here did space permit. Some statements made in the foregoing may be considered too sweeping by people unacquainted with the circumstances, who may argue that auctioneering should be a fair way of arriving at the true value of produce. With that I agree to some extent, provided those engaged in the profession confine themselves strictly to the legitimate functions of an auctioneer. Before concluding this paper I desire, on behalf of the Lockyer Agricultural Society, and, I may make bold to say, on behalf of farmers generally, to thank the Department of Agriculture and the Government for the very earnest care bestowed on the agricultural industry during the last few years. More has been done for farming in that time than has ever before been accomplished during the history of Queensland agriculture. Much, however, remains to be done before this important industry is placed in the position to which it is justly entitled. Amongst needed reforms in the agricultural industry there are none more pressing than the one to which this, my humble paper, has given, I fear, but feeble expression. (Applause.)

MARKETS, MARKETING, AND THE BETTER DISTRIBUTION OF FARMERS' PRODUCE.

[By F. W. PEEK, Loganholme.]

Before reading the paper on this subject standing in my name, I would desire to record the assistance I have received from Mr. J. D. Ritchie (Secretary of the Department of Agriculture, New Zealand), Mr. G. Jameson (manager of the Farmers' Co-operative Association, of Canterbury, New Zealand), and Mr. H. L. E. Rütthning (Brisbane), who have kindly forwarded me papers and information that have given me great assistance in dealing with this question. The reason I selected this paper is because I have been in receipt of a large correspondence from farmers and members of the association and others living in the district which I have the honour to represent at this Conference, and also from other associated bodies, pointing out the evils of the present system (or want of system) in the disposal of agricultural and horticultural products; and this being a question of vital importance to the agricultural community of Queensland is well worthy of every consideration. Up till very recent times the markets and the marketing have been of a very primitive description. Many farmers followed the old-fashioned custom of bringing their produce into town (when their closeness to towns allowed of such being done) by spring carts, wagons, &c., hawking what they may have to dispose of—it may be fruit, butter, eggs, potatoes, &c.—from door to door. Others, again, take their produce to stores and retail dealers, and, following the usual custom, have allowed such storekeepers and dealers to actually fix the price they themselves should pay for it, and it can be fairly stated that the farmer gets no more than the shopkeepers and dealers can possibly help. Others, again, send their produce by railway or boat, and consign it to agents for competition in open markets to auctioneers, &c., whose conditions are that the farmer or consignee has to pay such agents from 5 or $7\frac{1}{2}$ to 10 per cent. for selling. Then there are storage and wharf rates, railway freight charges, cartage, bags, bales, cases, &c., which all have to be deducted from the price obtained for the produce disposed of, and which, owing to the number of hands the produce has to pass through, each requiring a profit, have given cause for complaint for farmers. In some instances letters have been published in the Press of this colony from indignant farmers who, after planting, growing, and gathering their crops, and sending them to the so-called market, have received a notice from their agents informing them that their produce sold had not (or barely) covered expenses. Surely, then, this question of providing a better system of marketing deserves every consideration. The desire of the farmers to control, as far as they possibly can, the prices to be obtained for their produce is not only natural but reasonable. The cut-throat system pointed out and the means hitherto used have not been the best, either in management or in the way of returns, to the pockets of those who have been the pioneers in opening up land, growing produce, and starting industries therefrom. Any person dealing with this question of markets, marketing, and the better distribution of farmers' products must take into consideration the class of produce for which a market is required, and also the demand for such produce, which may be overproduced or insufficiently produced, thus causing a so-called glut or otherwise. When produce is scarce, an artificially increased value arises. When the so-called good season comes round and the produce is plentiful, low values ensue and poor prices are obtained. Farmers suffer because their freights, rates, and expenses are not lower proportionately—with the results, as before stated, of hardly being sufficient to clear expenses, and certainly not enough to fully repay them for their time and labour. The question then arises—How is this overproduction to be avoided and a better distribution obtained? The answer is: By the combined action and co-operation of those interested. When the farmers of this colony realise that individual effort is powerless, the sooner will their conditions of being able to control the produce markets be attained. The farmers, by co-operating, have the power in their own hands of regulating the markets as to under or over production, and can, by their combined action, be the means of assisting the small farmer and the struggling settler from going to the wall, prevent the undue competition of one against the other, and enable him to get a fair price for his produce. In the matter of better means of distribution, great assistance could be given to farmers, and especially to those small farmers with a variety of crops, garden and fruits, &c., if a system of cheaper uniform railway freights could be adopted on all Queensland railways—say at 6d. per case of 56 lb. weight irrespective of distance. I am sure it would be the means of disposing of a quantity of produce to those settled in the Western townships and lands of the colony. This matter has already been brought under the notice of the Railway and Agricultural Departments

and the Farmers' Representative Union in the present Parliament by the Logan Farmers' Association. It is gratifying to note the steady increase of farmers' associations and agricultural societies and combinations in Queensland. They now number upwards of ninety or 100, and they can, and should, be the means of advancing the mutual welfare and benefit of its members by holding meetings fortnightly or monthly, and inducing others to join with them. The main object and aim should be to become practical and useful. At such meetings the members should discuss the best means of advantageous purchase of implements, seeds, &c. They should table for their members the latest agricultural publications of an up-to-date nature (from which extracts could be read for general information) and a list of reliable agencies (with whom members have had dealings and could speak from experience as to prices obtained). Then they could form branches in other parts of each district, with duly appointed delegates to the head centre—whereby the requirements of each part of the district could be made known and advocated—and thus prove, by combined action, that far better results in the disposal of farmers' products would be realised than by individual or single efforts. I have endeavoured to show an initial step towards securing the object for which this paper was prepared—namely, the better system of marketing and distribution of farmers' products to the consumers. That is by combining and meeting together to discuss these questions. I know this means a new departure from the usual habits of our farming community, whose mode of life and occupation foster a feeling of isolation; but this feeling is soon removed by friendly intercourse and sociability, and when the question of combined action and co-operation is explained (showing the farmer how, by the present form of marketings, he is entering into competition with his neighbour—the results tending to a direct loss to both—and that means low values, when by co-operating and combining for higher prices better results would accrue to each). If the farmers wish to obtain all the benefits of practical co-operation for marketing purposes and to extend their influence they must have one head or central council, which should be representative of all districts—elected by and representative of each association equally; but, owing to the geographical conditions of Queensland, it might be thought advisable to some to have a central council in each of the three divisions of the colony—say, North, Centre, and South—and yet working under the same co-operative rules and organisation. Anyway that is for after consideration once such extended co-operation takes place. Funds, and large funds, will be required by those who will be entrusted with the carrying out of the objects for which the combination has been formed in its management. The mode of operations would have to be determined by its members and the officers forming the governing body, who would have direct control. In the raising of funds, I would favour the formation of a registered Joint Stock Company, with a limited liability, such being formed by farmers among themselves. I would limit the number of shares to each member. With a central board of directors, as advocated, it would help to do away with the little prejudices that arise in small district combinations; and the farmers by the greater union of all districts for marketing and other purposes—put in the charge and guidance of men of their own selection—would rest assured that the aims and wants of each association or district would be fairly dealt with. Let us now proceed to consider more in detail what co-operation for the control of markets and better distribution of products means. Co-operation is of two kinds—namely, either that of the buyers or consumers, or that of the sellers or producers. We are told that true co-operation unites both in a community. It may appear like a conflicting statement that a co-operation of buyers and sellers can be brought together to agree, seeing that their interests are directly opposite—the sellers desiring to get the highest monetary value, whilst the buyers desire to get cheaply. The true principle of co-operation to control the markets consists in the combination of many to secure a benefit to all, and no matter how the farmers and producers of one district may combine and hold out for fair prices—it may be of maize, wheat, or fruits, &c.—if others in the adjoining districts using the same open market will not combine with them, they will have to be met by competition. It would be no use in such circumstances holding out for fair prices that could—and might—be agreed upon by the union of all districts were they combined together for that purpose. But now with competition comes in that bad feature of the present system which we have to contend with—namely, the ring of wholesale dealers or middlemen. Under the system of auction sales there are rings of buyers who make it a matter of arrangement not to bid beyond a certain price. The only way to meet this difficulty is a direct appeal to the consumer to join and help you. With the capital you have raised by forming the joint stock company previously referred to (formed by shares being taken up by the members of each district association, the monthly payment of which should be made as light as possible), the co-operated farmers could establish stores for supplying the wants of its members in each district, also depôts where the produce could be collected and either sent away or distributed in other parts of the colony where required.

The consumers must have every inducement held out to them to deal direct with the farmers' association. They will thus be assisting the producers and consumers to do away with that loss that goes into the pocket of the middleman, who, at the present time, gets the difference between the price realised by wholesale dealings by auction sales and the retail dealings of the shops and stores. As a further inducement to the consumer, a bonus or percentage could be returned on all purchases made at the association stores, which is the usual mode adopted by co-operative societies—with this difference (and which is an important one) that such markets, depôts, and stores would be established by the farmers or producers, and not, as hitherto, by the consumers. Such a scheme would enable the farmers of one district to benefit those of another by interchange of products produced in the one and consumed in the other. The markets would be better regulated if each district were so combined together under one head. The estimated wants and requirements of each district could be ascertained, and the produce distributed accordingly. There would be no glut, as the market would be regulated according to requirements and more even prices would be maintained. The farmers, being able to deal direct with the consumer, would get a better price for their produce, and the consumer getting the best produce that could be put on the market—carefully put up and graded as to quality—would also receive a return or share in the profits made, from his dealings with the association. I might further enlarge on the benefits to be obtained from affiliation with the co-operative centres of other colonies and with those of England and the continent of Europe (who would take over our surplus production, easing our markets so that even prices would be upheld), and on the establishment of a wholesale farmers' co-operative association. But I can rest here. I have pointed out a preliminary scheme that is not only practical by the combined action and co-operation of the various societies and associations under one centre to control the markets and give a better distribution of farmers' products, but have shown the great benefits that would accrue to the consumer by dealing direct with the producer, whose interest it would be to supply a superior class of produce (each district vying with the other to obtain the best results). To further emphasise the usefulness and success of such institutions, I need only bring before your notice the last yearly report of the New Zealand Farmers' Co-operative Association of Canterbury, Limited, which began operations and was registered in 1882 by seven shareholders holding 141 shares. The balance-sheet for 1897—just fifteen years from its inauguration—states that there are 2,738 shareholders with 21,181 shares. The subscribed capital is £105,905, and the paid-up capital £43,260, and there is a reserve fund of £17,097. The total profit for the year amounted to £11,692, and a dividend of 6 per cent. and a bonus of 4 per cent. on the called-up capital, a bonus of 4 per cent. on all purchases, and a similar bonus on salaries and wages earned were given. Surely such great results in a sister colony are worthy the attention of our producers and consumers, with such resources as we have at our command. The assistance that is extended to agriculturists by the Government of this colony; the information that is being disseminated by the Agricultural Department, its officers, and experts in all branches; the practical teaching and training at our schools and college; the formation of State nurseries and experimental farms in various portions of this colony (where is being demonstrated the number and variety of products of every description that can be successfully grown)—all this is tending to foster the interest of our farmers and producers. Then by combining under an efficient organisation and assisting each other, through their associations, in the development of their respective districts, they will be placed beyond the combined rings of wholesale dealers and middlemen, become independent of local storekeepers, and be induced to produce their best to supply their own retail stores. Once the thing is fairly started, and its benefits begin to be realised, it will be seen that combined action and close association is a practical means to an end for its own sake, and will bring a fairer share of wealth to the pockets of the producers and workers in the agricultural interests of this colony. I may be thought to have been indulging in Utopian ideas; but the true solution of better systems of marketing and distribution of farmers' products must, and will, be obtained by the united co-operation of the agricultural and producing interests of this colony. (Applause.)

HOW THE GOVERNMENT CAN FURTHER ENCOURAGE AGRICULTURE.

[By W. DEACON, of ALLORA.]

In addressing the associated chambers of commerce in England last year, Lord Salisbury said that he always found that the worst way to recommend himself to an agricultural audience was to tell them they were flourishing, and the surest way of

enlisting their sympathies was to tell them they were on the brink of ruin. Consequently I am not going to eulogise the Department of Agriculture too much, nor very fervidly congratulate you on the improved prospects of farming through the increased activity and intelligence of the guidance afforded it by the State. The Department has made many advances during the past two years, and as it is still advancing and multiplying its functions, more for the purpose of discussion than of enforcing my own views, I propose to bring one or two things under your notice that I think might be done to assist farmers, in our part of the country at any rate. The question may be asked—Why should there be a Department of Agriculture at all? Why should farming get help and guidance more than any other industry? I submit that in the most progressive countries all staple industries now receive assistance either from the central or local governments from what is called technical education; but there are other, if not higher, reasons for promoting agriculture. Nations must have abundance of food, and at reasonable prices, and Governments have found—no matter how these Governments have been constituted—that at least good order depends upon it, for a starving or an ill-fed people are dangerous, and nothing breeds disaffection so much as positive want. It has always been held also as an axiom of safety that a country should produce within itself and sufficient for itself of the bare necessities of life. The stability and extent of other industries, too, as a general rule, depend upon the success of agriculture. First, I think farming would be materially assisted by the gathering and publishing of certain statistics of the amount of crops, and, as definitely as possible, the average demand and its locality. I have heard that it is the intention of the Department to do this, as it has been pressed upon its attention. It would be an advantage to farmers and others to know as early as possible the approximate amount of the crop of any product for the season, the demand for the colony for a whole year, and the actual consumption of the product in the previous year, month by month, were obtainable, otherwise the farmers are all at sea in putting their crop on the market, and the merchants as helpless as buyers as the farmers are as sellers. With regard to wheat and, perhaps, sugar, the information, though incomplete, is supplied in one form or another, mainly, perhaps, by the newspapers. But take other products—maize, for instance—the main crop of the agriculturist in the Southern part of the colony. Very little reliable information is ever obtainable concerning it, as is evidenced by the extraordinary fluctuations in its price during most seasons. I have seen it exported at 1s. 6d. per bushel early in the season, and imported towards the end of it at between 3s. and 4s. per bushel. Surely that was a great blunder as well as a heavy pecuniary loss to the producers and to the colony. So precarious is the market that, though ordinary or customary spells of dry weather really do not materially increase the consumption of this product, yet the fall of a point or two of rain in Brisbane often sends down the market with a run. I can best illustrate, perhaps, the apparently causeless fluctuations in the price of maize by giving a true case. During the last season but one it was not convenient for a farmer to sell his maize early in the season when it was 2s. 6d. per bushel, and shortly afterwards it fell; but he was under no alarm, as he knew the supply must be diminishing. But the price continued to recede, until when, according to all reasoning, it ought to have been high, it fell to 11d. per bushel, and he quitted at that. As he was delivering, it rose to 1s. 3d. per bushel, and more fortunate farmers than himself, before the week was out, were getting 1s. 6d. per bushel. The margin was probably the difference between a paying and a losing crop. When there is no knowledge of the supply, the merchant or that despised, but most useful individual, the middleman—who steadies the market by always being ready to buy—cannot operate except from hand to mouth. A knowledge of the supply and the average demand is absolutely necessary for the accumulation of stocks, without which no great trade in any product can be created or maintained. A farmer should not be compelled to be a speculator and hold his produce and be continually fidgeting as to when he shall put it on the market. He wants his brains for other purposes. When he is ready to sell he should sell, and he would be able to do it without loss if approximate and fairly reliable statistics of the crop were in existence. Given sufficient data, the merchant and the middleman will so operate that farmers will get a fair price for their produce all the year round, and the times for 9d. per bushel for maize in January, 3s. per bushel in April, 2s. per bushel in June, and any price in October or December will be at an end. I have been requested by the society I represent to bring under your notice the great advantage it would be to wheat-growing if more concessions were made in the freight for Queensland-grown wheat and for flour made from that wheat. Before I do so, I wish to make a remark concerning railway freights generally. An African traveller relates that when he reached a Portuguese port from the interior he

was presented by an official with an account for which payment was demanded. In reply to his inquiries, he was informed it was the amount of the tax for living in the interior of the country. By the help of a little reasoning and some strong rhetoric, he just managed to evade the tax. I sometimes think our generally high railway freights really amount to a tax upon us for living in the interior. If one lives, say, 200 miles from a port, he is, in the matter of freights, on an average two or three times further away from that port than the port is from London or New York. My friend Mr. Lamb, who represents the Eastern Downs Association at this Conference, imported a traction engine and threshing plant a few months ago; but failing to get sufficient concessions from the railway he engineered it over the Range to Warwick himself by road. The Railway Commissioner found it expedient to make considerable concessions to the settlers who have just taken up land on Headington Hill. Could not the same concessions be made to those farmers who have borne the burden and the heat of the day? Of course I shall be told that the railways must be made to pay. I am doubtful, however, whether high freights ever made any railway pay, and I am sure of this—that the most prosperous countries are those whose internal communication is good and cheap. It is from those countries that producers meet formidable and successful competition. Now I come to the particular products—namely, Queensland wheat and flour—in the freight of which my society think alterations could be made so as to materially promote wheat-growing. A few years ago flour made from Queensland wheat was carried on the railways at a much cheaper rate than other flour. Then our flour entered new markets and almost banished other flour from them, wheat was eagerly bought up, and the industry of growing it was making rapid strides; but, for some reason or other, the concession was withdrawn, and the industry received a decided check. Queensland this year has not grown more than one-third of the wheat it requires for its own consumption, yet one would think from the difficulty of selling it, and from the stocks the farmers have been compelled to hold over—and would still have to hold over were it not for the war—that there was a large surplus in the country. I am informed by one of the most experienced millers in the colony that, were the same rates in force for flour made from home-grown wheat as formerly, the farmers this season would have obtained 6d. per bushel more for their wheat, and every bushel of it would have been snapped up long ago. At present the millers cannot get into what I may term the prejudiced markets, and they say, “Only let us get into those markets on preferential terms, and we will soon dispose of the prejudice.” Hopes have been held out that when the system of railways is completed, by the construction of the Gladstone-Rockhampton line, concessions will probably be made for trainloads of any agricultural produce to the Central line. The sooner there is a chance of these hopes being realised the better. The following is a comparison of the rates for flour without discrimination on the Queensland and New South Wales railways:—

Freight for								Queensland.	New South Wales.
50 miles	...	...	...	...	...	...	...	0 15 7	0 7 2
100 miles	...	...	...	...	...	...	...	1 8 1	0 13 0
150 miles	...	...	...	...	...	...	...	1 17 0	0 18 0
200 miles	...	...	...	...	...	...	...	2 8 0	1 2 3
300 miles	...	...	...	...	...	...	...	3 3 0	1 9 0
400 miles	...	...	...	...	...	...	...	3 18 0	1 15 8

Queensland charges 12s. 6d. per ton to Brisbane (port) for 154 miles for 4-ton loads. New South Wales (towards port), 50 miles, 5s. 2d.; 100 miles, 8s. 2d.; 150 miles, 9s. 10d.; 200 miles, 10s. 7d.; 300 miles, 12s. 7d.; and 400 miles, 13s. 6d. for 6-ton loads. I am informed that the rates for wheat and flour are practically the same in New South Wales. I may mention that, as a special concession, we in our district are only charged 9s. 9d. per ton for flour to Toowoomba, something over fifty miles. Now I have seen it contended in reports and newspapers that Queensland freight rates bear favourable comparison with those of New South Wales. In fact, it has been said that in many cases ours are lower; but flour is generally given a wide berth in these reports. Is there any reason why freight on flour should be more than 100 per cent. higher in Queensland than in New South Wales? I am not concerned with any but Queensland flour, and I contend that it might be carried at New South Wales rates, if not lower. With regard to foreign flour, I do not, of course, ask for any reduction on that. That is no concern of mine, but rather of the foreigners. I am informed that the scheme is impracticable; but I do not see why it should be so now more than it was formerly. The

railway people now know how many bushels of wheat they deliver to the mills, and they need not carry more than the corresponding quantity of flour at the reduced rate. Besides, millers who overstep the mark could be made liable for full rates on all the flour they send from their mills. I bring these two things under your notice at the request of the society I represent, who, in the main, but perhaps not in all the details, are in full accord with me on the subject. If the Department of Agriculture gives the two subjects serious consideration—and in the latter case assist us with its influence—I am sure the result will be of advantage to the farmers in our part of the colony, and it may see its way to use its influence in our favour. I had intended to include some minor subjects in this paper, but I am afraid I have trespassed upon the patience of the Conference by the length of the paper as it is. (Applause.)

DISCUSSION ON THREE PRECEDING PAPERS.

Mr. W. D. LAMB (Yangan) said he could heartily endorse all that Mr. Deacon had said about the railage on flour. The Downs farmers were certainly heavily handicapped by the heavy rates. At Stanthorpe, for instance, flour is quoted at something like 30s. per ton lower than it sells at Warwick, notwithstanding that it had to pay a £1 per ton duty. As for the Warwick people sending their flour to the intermediate towns between Warwick and Brisbane, they simply could not do it. In order to get the reduced rates, the wheat had to be sent to a port, and he had known flour to be sent from Warwick to Ipswich, and from there shipped back to intermediate towns, a saving in freight being thereby effected. As for the rates on the carriage of agricultural machinery, they were absolutely prohibitive. What Mr. Deacon had said about his carrying machinery over the Range himself, was quite true, and he would have done the same with a thresher if it had been possible. On this latter class of machinery the Railway Department would not allow the slightest reduction, and he had had to pay full rates of freight on everything connected with the plant, including cases. Wheat-growing was now firmly established on the Downs, and they were likely to be exporters in that commodity in the near future.

Mr. P. McLEAN said it might save some little discussion in connection with Mr. Deacon's paper, if he pointed out that the Agricultural Department had not been asleep or blind to the benefits to be obtained from the dissemination of statistical information about the probable areas of different crops in the various parts of the colony. Years ago he had submitted a memorandum to the then Minister for Lands and Agriculture dealing with, that very question, and the proposed scheme was, to a certain extent, given effect to. All the divisional boards of the colony were then communicated with, and their co-operation asked for. If the clerks of the boards, who, from their local knowledge, would have been able to supply or obtain the desired facts, had co-operated with the Department, the bringing out of the statistics would have been practicable. But he met with a refusal from nearly every board, and he was told distinctly that the clerks had something else to do. Of course the advantages that would accrue from such a system as that suggested by Mr. Deacon, were obvious. Were it published in time that a large crop of maize was to be grown in the Bundaberg district, for instance, the fact would be of the greatest benefit to all the other maize-growing districts in the colony. He had even gone to the extent of having a map plotted out in sections, so as to have the information collected on a definite system. Queensland was a very large colony, and produce was grown and distributed over a very extensive area, so the value of such statistics could hardly be over-estimated. As they were probably aware, the statistical information of the colony was collected by the police, but over them the Agricultural Department had no control. There were many difficulties in the way of obtaining such facts as those referred to, and of publishing them early enough to be of use in the direction mentioned, but they were not insurmountable and could probably be overcome, and the information made available to farmers in good time. The Agricultural Department was now in a much better position than it was when the scheme was first mooted. They

had now a monthly journal by which the information could be spread all the colony, and, if the facts could be obtained, farmers would doubtless be in a better position to be able to regulate their operations. With regard to the marketing of produce, many of them doubtless recollected the Farmers' Co-operative Company that was started in Brisbane some years ago. To his sorrow, he had been a shareholder of that company, and, with regard to its final results, he might say that, although the company was formed for the benefit of producers, the directors found that the shareholders, instead of forwarding their produce to their own company for disposal, sent it elsewhere for sale.

Mr. P. HAGENBACH (Warwick) stated that with regard to the clerks of divisional boards collecting statistical information for the benefit of farmers, doubtless the clerks would object to having additional work thrust upon them. Probably, however, if the Agricultural Department sent out circulars, all ready for filling in, and asked the boards to have these distributed among their ratepayers, the boards would co-operate, and the ratepayers would supply the desired information. A large number would at any rate most likely do so. If such a plan were adopted, Mr. Deacon's idea could perhaps be carried into effect. He had also been a shareholder in the Co-operative Farmers' Company mentioned by Mr. McLean, and, like him, had lost money in it. Co-operative societies do not always work successfully. He would like to see railway freights reduced to reasonable rates, and then let every man sell when he wishes. It would be awkward for a man to have to sell when he did not desire to do so. A man should be free to sell when he likes, and that is only a reasonable desire. Reduction in railway freights was a most important question for farmers, however, and he hoped the Government would give early attention to it.

Mr. E. BYTHEWAY (Gympie) stated that in his district considerable difficulty had been found in getting the farmers to co-operate. Farmers were suspicious, and wanted to know what axes the promoters of co-operative companies had to grind. The Government had probably done all they could in the matter. There was the butter factory system, and in Gympie they had tried to get the farmers to start a factory on the co-operative principle, but the farmers appeared to want educating on the subject. A point in the marketing of produce that was worthy of more attention than was at present paid to it was what might be called the "shopping" of it, or the presenting of it in a merchantable condition. It should be got up and branded properly, and generally have a business-like appearance. The trussing of hay in an attractive style was an instance in point. They all knew things well "shopped" were half sold, and that was an idea that might well be impressed on all farmers. It was one that the pastoralists of the colony understood perfectly, as was shown by the well and neatly trussed bales of wool that came down to port. It had to be confessed, on the other hand, that Queensland hay was not always marketed in a manner most likely to attract buyers, and more care expended in this direction would doubtless be well repaid.

Mr. T. E. COULSON (Rosewood) considered that the establishment of markets which would bring both consumer and producer into direct contact with each other was essential, and he thought the Government would do well to reserve in all large towns land for such markets. He sincerely trusted the present Conference would assist in the bringing about of a better system of marketing and distribution of products in the colony. As an instance of the unsatisfactory nature of the present system of distribution, he instanced the case of a friend who, on offering some chaff in Brisbane for sale, was quoted from twelve different merchants an almost similar number of prices for the consignment, ranging from £3 10s. to £5 5s. per ton, at which latter price, of course, he disposed of the chaff. This showed the necessity for farmers educating themselves in the matter of knowledge of the real value of the products they had for sale.

Mr. A. MACFARLANE (Rockhampton) congratulated the writers of the papers, and, in connection with Mr. Deacon's, thought the Conference should pass a resolution in favour of reduced railway freights, which, in his opinion, was a matter of the utmost importance. They would not be asking too much if they asked the Railway Commissioner to bring Queensland rates somewhat in line with those in force in New South Wales. With regard to the publication of agricultural statistics, he was glad to hear from Mr. McLean that the Agricultural Department had been up to date on this point. Co-operation, of course, had the sympathy of every settler on the soil; but he thought some of those who had spoken expected too much from co-operative societies. Mr. Peek's paper was a very good one from a producer's point of view. Co-operative societies, however, had to compete on an open market with other merchants and dealers, and he thought, therefore, that the benefit to the farmer would not be so much from the enhanced value of his produce as from the bonuses he would receive. If farmers expected co-operative societies to raise the price of produce, he thought they expected too much. Although several attempts made in the district to establish co-operative companies had hitherto been unsuccessful, he was not without hope that, after the Conference was over, the seed which was now being sown would take root, and they would shortly hear of the establishment in Rockhampton of a co-operative bacon and dairy factory. Everything was in its favour, as Central Queensland was undoubtedly eminently suited for pig-raising, and for dairying they could not have a better climate.

Mr. SANDROCK pointed out that in the North it was not railway but steamer freights they often had to contend against. He agreed that more system in the marketing of produce was a matter of vital importance to farmers. Shipping fruit was a case in point. He had shipped fruit to Townsville, and in return had received a bill for expenses which the sale price of the fruit was not sufficient to fully cover. As for the Government taking over the markets at Brisbane, that was hardly practicable; but some local authority should surely be able to do so. Some supervision over the markets was evidently wanted. An attempt had been made in his district to establish a co-operative society there, but somehow or other the farmers could not be brought together to combine, and after a long struggle the scheme had fallen through.

Mr. E. SWAYNE (Mackay) said they had heard of some of the failures of co-operation, but in the Mackay district the farmers had reduced the cost of purchase by 10 per cent. through co-operation. He spoke of buying, but doubtless a similar advantage could be secured in selling. He would like to ask Mr. Peek if he knew anything of the selling co-operative companies in New South Wales. He believed that in some places they were taking the places of the commission agents, and he thought there was a co-operative company in South Australia which was of great assistance to farmers in connection with the sale of wheat.

Mr. W. R. ROBINSON (Toowoomba) thought it rather hard that they should burden the Agricultural Department with the collection of the statistics that had been mentioned. Agricultural societies should collect such information, as it would give them something more to do than the holding of third-rate shows. With regard to farmers' unions, Queensland farmers had had rather a bitter experience of them. A union was started in Toowoomba, but many of the shareholders were found to prefer to hawk their produce about the town instead of disposing of it through the union; or they only fell back on the union when other means of selling failed. Many farmers were considered unreliable by produce dealers, and they had themselves to blame for this reputation. A point worth remembering was that a farmer had only to sell to one man, but the auctioneer had to sell to perhaps twenty, and take as many risks. The farmer, on the other hand, took very little risk, and there were probably few people who made less bad debts than farmers. Railway freights were always a sore point with the Warwick people, but he saw no reason why

the Railway Department should not meet them on a fair basis. With regard to New South Wales products having an advantage over Queensland, owing to the lower railway rates there, it should be borne in mind that a good deal of the produce from the sister colony was, owing to the duty, practically shut out from Queensland.

Mr. JOSEPH HUDSON (Rosewood) had on more than one occasion suffered pretty severely at the hands of the auctioneer and middleman. If he sent down to market a consignment of inferior produce and a consignment of superior, the prices realised for the two would be but little different. In fact, it would not pay him to get his produce up in a high-class manner. At present the middleman and auctioneer ran the markets, and farmers, under existing conditions, could not get at them. The only remedy he could see was in co-operation, and with this he thought a good deal could be effected. A gentleman had stated co-operation would not make much difference in the price a farmer would receive for his produce, but on this point he differed from Mr. Bytheway. In the first place there is a tremendous difference in what the farmer gets for his goods and what the consumer pays for it. It generally amounts to one-third, and not unfrequently to one-half. Who got it? The consumer suffered, and the producer likewise. Like some of those who had already spoken, he had lost money over the farmers' union established in Brisbane. The fault in that union, however, was that it began as a co-operative society and dwindled into a commission agency business. Farmers soon found they could sell their produce just as cheaply elsewhere as through the union, which rapidly became a commission agency, and one of the worst. If a man sent his produce to an ordinary auctioneer, he got his cash quickly, but the farmers' society was very tardy in sending along its cheque. This latter, especially, was a reason why farmers sent their produce to private agents.

Mr. P. DWYER (Tenthill) could endorse the remarks made in Mr. O'Keefe's paper, although he had also lost money in the Farmers' Co-operative Society which had been referred to. As instancing the way, however, in which that particular society was managed, he mentioned that even its chairman of directors did not dispose of his produce through the medium of the co-operation.

Mr. T. WHITELEY (Coowonga) mentioned that Mr. Coulson's idea of having a market where the consumer could buy direct from the producer was to be seen in practical operation in Rockhampton, and, on Saturday morning, he would be happy to take delegates across the street and show them such a market. Like Mr. Robinson, he also thought agricultural societies should take up the matter of the collection of farming statistics. The secretaries were generally in contact with the farmers, and they would probably be able to obtain the necessary information easier than the divisional boards. The sending out of circulars would, perhaps, be too expensive. With regard to the middleman, a recent experience of his (Mr. Whiteley's) had been the sending up country of a consignment of produce to an auctioneer four months ago, but he had not yet received any money for it, nor in fact had he ever heard anything about it. It seemed to him that the gist of successful co-operation was to get straightforward and honest men at the head of affairs; also men who had been through the mill—men who had been farmers, and who could feel for and sympathise with them, knowing what they had to put up with. The directors should be similar men; and if they found their manager was not what he should be, they should have another man in his place at once. Co-operation was very necessary in the Rockhampton district, and they were now trying there to float a general farmers' co-operative society, which was to commence at first in the shape of a dairy factory, and then gradually work out to embrace other branches of the agricultural industry.

Mr. JORGENSEN (Pialba), in the course of an interesting speech on the subject of marketing and co-operation, mentioned that on one occasion he had sold a fairly large parcel of butter to a storekeeper for 8d. per lb. Half-an-hour afterwards the butter was sold at 1s. 2d. per lb.; Mr. Jorgensen getting 8d. per lb. for keep of cows, milking, manufacture and carting into

town of the butter, while the storekeeper got 6d. per lb. for allowing it to lie on his counter for thirty minutes. With regard, however, to a member of a co-operative society disposing of his produce other than through that society who could blame him if he got a better price by so doing?

Mr. S. A. LINDEMAN (Bundaberg) asked whether in the Brisbane society, which had been referred to, and which had failed, the profits were to be paid to the shareholders?

VOICES : Yes.

Mr. LINDEMAN said that in such cases he would always venture to predict failures. If the dividends were distributed among the shareholders, it was a commercial and not a co-operative concern. A butter factory had been started in Bundaberg a few days ago, and in the original prospectus the profits were to be divided among the producers, but when the matter came before the meeting it was thought by some that the profits should be distributed among the shareholders, according to the shares they held. He (Mr. Lindeman), however, moved and carried an amendment that the profits be distributed according to the value of the produce supplied to the co-operation by each member. If in a co-operative society there were a number of shareholders who were not producers, these men, as often as not, were behind the scenes, and if the company was prospering would buy up the unappropriated shares as well as shares from other holders. The company, of course, then rapidly went from a co-operative to a commercial concern. He would therefore impress on them the necessity of always insisting, in the establishment of co-operative societies, that the profits be divided among the producers, and according to the amount of the produce supplied. He would also suggest that none but *bonâ fide* producers be allowed on the directorate.

Mr. W. J. YOUNG (North Isis) thought many would agree with him when he said that the farming class in Queensland was about as hard as any to get on with. They knew as little about business as most people, and, as long as human nature was what it was, he thought co-operation would never succeed. He concurred with Mr. Whiteley in the advantages of a market where buyers could deal direct with sellers, but he thought the kind of storekeeper referred to by Mr. Jorgensen was very rare in Queensland. Taking things all round, the profits realised in this colony through the sale of produce were barely sufficient to pay for the cost of distribution. Farmers desired cash, and, in a co-operative society, growers would have to wait for their money or have their produce sold on commission. After referring to the way in which farmers sometimes rushed markets, he (Mr. Young) stated that he thought the establishment of central markets, like that mentioned by Mr. Whiteley, would do away with many of the difficulties farmers had at present to contend with in this direction.

Mr. JAS. DAVIES (Coowonga) stated that he had been connected with co-operation in the old country, and his experience of it had been of a very satisfactory nature. He was in one small company which started with a capital of £1,000. Five years after, when he left the country, the value of the company's property and capital had increased to £5,000. In the rules of a co-operative company formed for distributing purposes should be one to expel members who disposed of their produce other than through the society. Another advantage in a society would be the provision for allowing advances to be made, if necessary, on produce that was brought in by members. This would be of great help to many struggling farmers.

At this stage the CHAIRMAN read the following letter, dated 7th May, which he had just received from Mr. T. R. Garrick, secretary of the Milbong Farmers' Association, Milbong, Fassifern:—

The members of the above association would most respectfully ask you to draw the attention of the delegates of the various agricultural societies to the anomaly that exists in regard to the buying of wheat and the selling of flour. I may mention that the secretaries of several kindred associations have been communicated with on purpose to have the views of their associations on the subject, and, acting on the

suggestion of the Logan Farming and Industrial Association (who are in sympathy with us), it was decided to submit the subject to the Rockhampton Conference to be there discussed, if agreeable. The anomaly referred to is this: Wheat is bought from the farmer by the miller per the imperial bushel; but the flour is sold at per ton of 2,000 lb. instead of the imperial ton of 2,240 lb. We know that it is a trade custom to call 2,000 lb. of flour a ton; but we see no reason why it should be so, any more than a ton of potatoes or coal. We argue that if flour is sold per cental, wheat should be bought on the same basis, and *vice versa*. Furthermore, it is considered the price of flour is not in fair proportion to the price paid for wheat—that is, that the farmer gets too little for his wheat, and the consumer is charged too much for the flour. In support of this contention I would refer you to the May number of the *Queensland Agricultural Journal*, where, under the heading “The Wagga Co-operative Mill,” it is shown the consumer is charged £2 per ton extra and the farmer gets 9d. per bushel too little for his wheat. However, the article will explain itself. It has also been brought to the notice of the association that Australian flour has been quoted in London at 25s. per 280-lb. bag, or £10 per imperial ton, and in Australia similar flour has been quoted at the same price per ton of 2,000 lb. This association considers that such differences should not exist, and it is on that account that kindred associations have been communicated with, with the view of endeavouring to get an equalisation and abolishing the present anomaly. Thanking you in anticipation, and trusting that you will have a successful conference. P.S.—I regret very much that our association could not send a delegate to speak on the matter; but our association is only newly formed, so funds would not permit it.

Mr. W. R. TWINE (Wallumbilla) stated that ever since the time old Adam had been sent to earn his living by the sweat of his brow, farmers had had disabilities to contend with. Mention had been made of the delinquencies of the middleman, but personally he had never found him as black as he was painted. Still, however, he knew of several anomalies in the present auction system. He once watched the sale of a consignment of grapes in the Brisbane market. The auctioneer put them up at so much the case. A final bid was accepted, and the purchaser was allowed to take away a certain number of cases. The auctioneer then stated that the balance of the cases of the consignment could be had at the same rate as the cases just sold. This he thought was not fair to the grower. However, he felt certain there were plenty of honest auctioneers. Farmers asked for cash for their produce, but auctioneers often had to book and take a certain amount of risk. The greatest assistance the Agricultural Department could give to farmers would be to induce them to co-operate. Co-operation was the whole soul of the cause they had in view, and so long as it was not attended to, so long would farmers suffer from the disabilities referred to. Again, the various farmers' associations throughout the colony should form definite lines of action, and the associations could mutually assist each other. The present railway freights of the colony required altering, and in this connection he would mention grapes from Roma to Toowoomba. By the mail train a charge of 3s. 3d. per cwt. was made, but if the fruit went by the goods train the freight was only 1s. 1d. per cwt. It was said grapes would hamper the mail train, but the difficulty could be met by limiting the quantity of grapes to be sent. It would certainly be of material assistance if growers were allowed to send some of their grape crop to market by the mail train. As for the difference between the standard weights of wheat and flour, he had also been asked to bring the matter forward. Flour was sold at 2,000 lb. to the ton, which made a 10 per cent. difference, and for which he could see no reason. As for the difference between the price of wheat and that of flour, that was a matter between the millers and the public. If the latter allowed the millers to charge too much for their flour, it was their own fault. The freight on flour from Toowoomba to Yuelba, 180 miles, was £1 per ton, this comparatively low charge being made in order to catch the border traffic. From the Roma mill to Yuelba, only 37 miles, the freight on flour was 10s. per ton, and, notwithstanding the border traffic, he considered this was an injustice. It was unjust to the producer, as it naturally affected the price of wheat in the Roma district. He, too, thought farmers' associations should assist in the collection of agricultural statistics. With regard to some

of the disabilities of farmers in the matter of marketing, they had themselves to blame. Bulk lots were not always up to sample, and this made dealers and buyers suspicious. In co-operative societies he held that no non-producers should be shareholders, and he considered the idea of distributing the profits on the value of the produce supplied a very good one.

Mr. J. G. PALETHORPE (Toowoomba) said there were many causes for the depression in prices. Many people were not strong enough, financially, to hold out with their produce till prices were better. Farmers would get into the books of business people during bad seasons; then came a good crop, and the growers had to realise at once in order to pay off their indebtedness. When some institutions saw farmers could pay outstanding accounts by selling their crop, they often insisted on their doing it at once, and this was one of the causes that had a great deal to do with the marked differences in the values of farm produce. After referring to the storage of wheat (and in this connection he considered trouble and loss could be minimised by the action of the farmer), the speaker suggested that more care be bestowed on the getting up of agricultural produce for market. He often bought chaff full of stones, manure, &c., and of course such a condition of things was unsatisfactory. If a grower saw the way in which certain articles of produce were landed in Brisbane from New Zealand, he would easily understand how these things sold better, as a rule, than the Queensland articles. Still, matters, in this connection, were improving in the colony.

Mr. O'KEEFE (Laidley), in reply to the remarks on his paper, maintained that auctioneers, as such, ran no risk whatever in the sale of produce. It was only when the auctioneer became a dealer that he incurred risks. If an auctioneer followed his legitimate business, he should not purchase at all, and then he would not have to complain of his risks. If the auctioneer confined himself to that business he would be the last to ask to have him done away with, as he considered the auction system an excellent one for the disposal of agricultural produce. Abuses, however, crept in, and this was the cause of many of the objections to the auctioneer. It was because he was a dealer, because he bought what he should only sell. Various gentlemen had made remarks about their experience in a certain farmers' agency society, but in the first place it ought to be remembered that the remarks all dealt with one particular society; and as accounts of the fate of this society had done much to hinder the spread of the principles of co-operation in the colony, he might be pardoned for speaking a few words additional to what had been said on the subject. In the first place, that business was not a farmers' co-operation. It was not carried out by farmers for farmers. He did not know that farmers started it. A gentleman sold his business out at a satisfactory figure to what was to be the so-called co-operation, and canvassers were sent round to get farmers to subscribe to it. He himself took it for granted it was going to be a farmers' co-operation, and took some shares, but after that he could never get anything definite about the concern. It was worked by men who had never been farmers, and he desired to know whether the whole history of the society was a fair criterion of the operations of co-operation in practice. He considered the principles of co-operation were the soundest a farmer could take up. Farmers as a rule had not much business training, and through their isolated position never had opportunity for obtaining such, but they could be educated gradually. It would be a mistake to establish a huge co-operation at one step, but small societies could be formed at first. He had not said in his paper the middleman should be extinguished. They had to have him, but he should be kept in his right place. When lately at Brisbane he saw a first-class sample of chaff knocked down at £3 17s. 6d. per ton. Immediately afterwards a second-class sample fetched £5 18s. He asked a bystander, an auctioneer, if this was legitimate business. The reply was, "Look at the purchaser of the second lot, a man who should buy his chaff over a retail counter." They could understand the drift of the thing. The purchaser was a poor cabman, perhaps, and the dealers in the market had

swarmed around him, run him up, and gave him a lesson never to come and buy direct in the market again. He agreed in the suggestion of Mr. Lindeman that in co-operative societies the producers should get the profits. In some societies a clever business man would hold a large proportion of shares in one, and soon got such control over it that he ran it as he liked. Farmers then lost confidence in the concern and sent their produce to other agents.

Mr. F. W. PEEK (Loganholme) had been pleased at the reception of his paper. It was owing to the reasons already stated that he did not wish to press complaints into his paper. He simply wanted to give a preliminary scheme that could be made practicable, and he had found that every delegate who had spoken had gone on the same lines. Even in the matter of collecting statistical information, it could only be done by co-operation. The farmer is isolated, and is precluded from obtaining such information as to the real value of the produce he has to dispose of. With regard to the market question, he instanced the case of a complaint he had lately received from a Mount Cotton fruitgrower who had brought some produce to the Brisbane market. He asked the auctioneer what it was worth, and was met with a demand as to what he expected for it. He finally agreed with the auctioneer to have it disposed of at market rates, and then left. On returning he was told there would be no necessity to have the goods put up to auction, as they had been disposed of privately at market rates. On going down the street, however, he noticed the goods being carted off to the auctioneer's own store. On the Brisbane town clerk being applied to for a copy of the rules of the market, he was advised the regulations were not now in force. Anyone could see where the faults of the present system came in. Anyone who cared to speculate in a sixpenny pocket-book and a lead pencil was allowed to speculate at the expense of the farmer and producer. Farmers' associations were largely formed to assist farmers in the establishment of markets. As far as improvement in the getting up of produce was concerned, that could only be effected by farmers getting together and seeing what each was doing in such matters. With regard to Mr. Swayne's request for information about the working of certain co-operative societies in the southern parts of Australia, he had to state that he could not comply with it, although he knew such institutions were being worked, and worked successfully. He had, however, particulars about the Canterbury Association, as he had mentioned in his paper. This particular company dealt in everything. It had its own ships running, and seemed to have a general grasp on business. One gentleman had stated that day that the farmer was not a business man, but he (Mr. Peek) thought that the idea that the sole business of the farmer was to plough or hoe should be done away with. Machinery, new appliances, altered conditions had so changed the farmer, that he now probably was in a better position than the ordinary business man. At any rate, the farmer of to-day had to be an educated and intelligent man. The Government had recognised this when they had established a college for the purpose of training young men who intended following agriculture as a calling. With regard to the Rockhampton market, he (Mr. Peek) considered it was a preliminary step. The town clerk had very kindly shown him round it, as well as round many other places of interest in the town he might mention, and he had told that gentleman that although the market was a step in the right direction, it had one fault—and that was competition. That competition should be done away with. A man with a lot of produce could lower the market prices, and the small man would have to comply with them, although he was doing it at a loss. Combination would bring about good prices. There should be a grading inspector, who would divide the produce sent into classes, and members of the association should agree to his decisions. Prices could then be fixed all round for each class.

Mr. DEACON (Allera) said the middleman was just as bad, just as good, and just as honest as any other man. The Co-operative Farmers' Society that had been formed in Brisbane, and which had been referred to that day, was established by farmers mainly. It was not formed to buy out a man's business,

but to form a new business. It was established, and, after a short and unsuccessful career, then bought out the agent's business referred to. He (Mr. Deacon), on one occasion, asked the manager of the new concern why it did not pay, and, in reply, had the numerous clerks, auditors, books, secretary, &c., pointed out to him. That was where the money went, and where it nearly always would go in co-operative companies. It was a mistake to think the auctioneer never gave credit. Very often the produce a farmer got cash for was sold by the auctioneer on credit. At any rate, he knew it was done in Brisbane. Of course, it should be remembered that, although a farmer might be eager to get cash for his crop, he had given, say, six months' credit to the land. He himself had sown wheat in May, reaped it in November, sold it in March, and then got a four months' bill for it. In summing up on this point, he considered that farmers could not do without the middleman. In the matter of the collection and timely publication of agricultural statistics, he thought the idea was a good one, and one that might well be put into execution. At the same time he hoped that if the statistics were published they would be correct. Such statements as probable general yields of from 30 to 40 bushels of wheat to the acre in a district only did harm. If they were believed, they had a tendency to bring the price down to rates which were not warranted by the real facts of the case. Personally, he would rather see a probable crop under-estimated than over-estimated. These reported yields of 40 bushels of wheat to the acre reminded him of a gold-mine near his district, the manager of which reported a return of 4 oz. to the ton. On making further inquiries, he (Mr. Deacon) found that a ton in that mine weighed 80 cwt., and in the same way the acres which gave 40-bushel yields generally extended over from 6 to 8 roods. In conclusion, he hoped the matter of railway freights would not be lost sight of.

Mr. J. GILMORE (Allora) supplied some interesting particulars in reference to the letter received from the Milbong Farmers' Association. As for the difference between the prices paid for wheat and flour, this had been explained to him by a Downs miller as being due to the fact that millers had no proper outlet for their flour. Reduced railway freights would permit of this, and farmers would benefit through getting an increased price for their grain.

Mr. CHATAWAY, in summing up the papers and discussion, said that one thing was perfectly clear. Mr. Twine had stated that there was no competition in the Brisbane market. A case of grapes was put up and knocked down at a certain price. Then anyone could take as many cases as they liked out of the whole consignment at the same price, and, in stating this, Mr. Twine evidently inferred that the buyers agreed to make one bid. Mr. O'Keefe had shown that the sellers brought their produce to market and competed against themselves. It therefore seemed to be clear that what was desired by producers was no competition among sellers, and keen and animated competition among buyers. That, he supposed, would sum up the position they desired to get themselves into. A great deal of light had been thrown on co-operative work, and the difference between co-operative and joint-stock enterprises had been clearly pointed out. This distinction should be thoroughly understood by all who embarked on co-operative undertakings, for, as Mr. Lindeman had said, the failure of many so-called co-operative companies was owing to the fact that they were not co-operative at all. There was, however, another reason why co-operative enterprises had so often failed, and that was more or less incapable management. One delegate had said that they required a manager who could feel for farmers—one who had laboured under the disabilities that they were labouring under. Well, all he could say was that misplaced sympathy had killed a lot of things. A reason why co-operative enterprises so often failed, was because the co-operative producer refused to pay for brains and experience. The co-operation came into competition with the best brains and keenest intellects in the world, and that was largely why co-operative production, apart from co-operative

distribution, had failed in England. The co-operative producer, unlike the co-operative distributor, had declined to pay for men equal in intellect to those against whom he was competing. Some co-operative boot factories had failed in England for that very reason. Sympathy with the producer or with the man working in a factory was very good, but it would not give bread and butter and something more to either of them. The question of marketing had been dealt with, and Mr. Bytheway's remarks about the advantages of improvement in the getting up of produce for market were worthy of earnest consideration. Other gentlemen had pointed out that a few farmers were not absolutely honest; that bulk lots were not always equal to samples; but, for his own part, he could say that, in the agricultural districts with which he was well acquainted, one could depend on getting from most farmers what he asked for, or what the farmer said he would supply without personally inspecting, and it should not be passed unnoticed that all the farmers of the colony appeared to be recognising that honesty was the best policy. The advantages of a good reputation in this connection could not be over-estimated. With it a man is able to sell his produce at once and get the highest price for it, while another man has difficulty in even finding a market. Mr. Chataway then announced the business for the following day, and concluded by inviting the delegates to a picnic at Emu Park on Saturday.

In reply to Mr. Sandrock, Mr. P. McLEAN stated that the Agricultural Department had introduced the Canaigre into the colony, and if any gentleman wished to try it by applying to the Department roots for planting would be sent him at the proper season. There was seed in the hands of the Department at the present time, but it was difficult to get Canaigre seed to grow. The roots, however, struck readily, and the plant thrived in Queensland. It was a valuable tanning plant, and there was said to be an excellent market for it in Great Britain. The question of export at present was a difficult one, and so far as could be learned the best way to dispose of it was in the form of liquid extract.

The Conference then adjourned for lunch.

THIRD SESSION.

THURSDAY AFTERNOON, 12TH MAY, 1898, 2.15 P.M.

WHEATGROWING IN THE CENTRAL DISTRICT.

Mr. W. H. CAMPBELL (Barcaldine) said the Under Secretary for Agriculture had done him the honour of asking him to read a paper on wheat-growing in the Central Division, and he should like to say that he did not know anything about wheat-raising on the coast or of the experiments that had been carried out by the Department of Agriculture in the Peak Downs district. It might appear presumptuous on his part to come before a number of experienced farmers who had grown old in the industry, while the people of Central Queensland were only little toddlers who would have many a fall, but who hoped to progress and become big rivals of the great Darling Downs district. Mr. Campbell then read the following paper:—

The traveller by train, for the first time crossing our great Western plains, cannot fail to be impressed with the vast potentialities of this favoured country. Standing on the platform of the railway car, he sees before him an ocean of waving grass stretching out to the horizon with only here and there an isolated tree or small clump of timber to break the undulating line where earth and sky appear to meet. Where a landslip is visible in the banks of some small watercourse, or where a lengthsmen with pick and shovel has been at work excavating earth to build up the permanent way, the quality and depth of the soil are revealed, while the luxuriant growth of indigenous grasses on the surface proclaims the wonderful richness of our Western lands when stimulated by the rain necessary to quicken the dormant vegetation into renewed existence. Here, the traveller might well exclaim, is an ideal wheat country. In the mallee districts of Victoria, in the box flats of the selections in New South Wales, on the scrub lands in some parts of Queensland, the farmer has to confront

the task of first clearing his land before he can break up the soil. On the Western plains he can on one day select his 1,280 acres, and the next day the nose of the plough may be in the ground preparing it for its future destiny. Here, also, the intending selector has the railway at his gate, ready to transport his material from port, or carry his products to the same place, at a moment's notice. Yet, possessing these advantages, the Western plains have not attracted the wheatgrower from other colonies and other countries. This may be due to an impression which prevails in the south that the climate of Central Queensland is unhealthy and oppressively enervating; to a disinclination to exchange familiar scenes and persons for strange surroundings; to natural unwillingness to invest capital in an undertaking which has not progressed beyond the experimental stage; and to dread of an insufficient and uncertain rainfall so fatal to the successful production of cereal crops. Those who have lived in Central Queensland for any number of years can smile at the first objection. With some pride we may point to the sturdy children and well-grown young men and women born and reared in the district, and to the freedom from disease enjoyed by the whole population as compared with localities that boast of a better climate and more favourable surroundings. Perhaps during the hottest months in the year from the beginning of December to the end of February, the heat of the sun may prove too severe for the farmer accustomed to the milder climates of Victoria or South Australia. But here the wheatgrower has a distinct advantage, as the crop, ripening so early in this dry climate, can be harvested in October, and the farmer may rest until February or March, for unless the early rains fall before that time the new ground is not ready for the plough. In mixed farming, of course, there is work all the year round; but for wheatgrowing only, the farmer may follow the example of the Western shearer, who puts down his tools in November and resumes them again in March, in the meantime spending his enforced vacation where he pleases. The disinclination to remove from old friends and familiar scenes is simply one of sentiment and all the more potent when the emigrant is asked to embark upon an uncertain undertaking in a strange land. But it is the uncertain rainfall exhibited so uncompromisingly in the meteorological records of the West which is the most pronounced factor in deterring the agriculturist from settling on the land. For the last twenty years the register of rainfall has been most admirably kept by the successive telegraph masters at Barcaldine and Blackall. The results show that for three out of every five years the fall of rain has been too scanty or too unseasonable to ensure the ripening of a wheat crop. It has been said that in Kansas if, out of five crops sown, three are harvested, the grower is satisfied; but in Queensland he may strike the three bad seasons at the start, a contingency sufficient to deter any but the most sanguine from attempting the experiment. Then there is the extraordinary transformation in the appearance of the country after a copious fall of rain, which, curiously enough, acts as a deterrent to agricultural operations. The celerity with which the barren plains are clothed with grass and the rapid putting on of condition by the stock depastured there appeal to the selector in favour of grazing rather than tillage. The money he would require to expend in bringing 500 acres under cultivation is sufficient to improve and stock with sheep 10,000 acres of the same country. In the former prospect is opened up a vista of hard work and possible failure; in the other, no work, little risk, and the certainty of a large profit. It is no wonder then that the Western settler should prefer the simpler and safer process of non-interference with Nature's products to the more laborious undertaking and uncertainty of profit which cultivation of the soil must necessitate. So far the experiments made in the vicinity of Barcaldine have only proved that unless rain falls in sufficient quantities at the right time wheatgrowing is likely to be a failure. The year 1894 witnessed copious rainfalls every month from February to June, with lighter rains again in July and September. A small patch of wheat sown on the Downs in April ripened in September. Two acres of brown soil were prepared for seed in 1895, but no rain fell until July. The seed germinated, but the plants died away during the long spell of dry weather following. In 1896 the same 2 acres were ploughed again, and the seed sown in June. A moiety of this also germinated, and, helped by some rain in July, came into ear during the early part of September, but did not mature, being too far away from any homestead to receive protection against the ravages of marsupials and grain-eating birds. In 1897 the season was still more unfavourable for wheatgrowing, as from January to July no rain fell in sufficient quantities to moisten the subsoil. Possibly by a method of tillage recently adopted in the arid districts of the western states of America, where the scanty rainfall has been conserved in the soil by deep subsoiling and subsequent disturbance of the surface during the growth of the crop, it will be discovered that wheat can be successfully produced in the West without resorting to the application of artificial

moisture. On the other hand, the dry atmosphere of the Western country has its beneficial influence upon wheat in preserving it from rust, and hastening the ripening of the grain, so that it is ready for harvesting before the extreme heat of the summer comes or the dreaded thunderstorms of November can interfere with the growing crops. Thus far, then, the experiments made are more negative than positive. Briefly, they may be taken to show that in a bad season the farmer will have no crop, and he may expect to encounter more bad seasons than good ones. On the other hand, he may be fortunate enough to strike a succession of seasons which may suit him, although they count for bad with graziers who depend solely upon the indigenous grasses as food for their stock. For instance, rain may be withheld in the autumn and fall in quantities during the winter months. This, with light showers early in September, would produce no grass for the grazier, but would just suit the farmer. With such uncertainty, however, it is hard to be content; and therefore it is pleasant to turn from the contemplation of failures in one direction to what have been undoubted and brilliant successes in connection with substituting for the scanty rainfall the application of artificial moisture to the cereal crops by means of irrigation from artesian wells. Taking it for granted that the water from artesian wells is free from the mineral salts destructive to plant life (and this description applies to all water from the lower artesian basin over a very wide area of the Western district), the only question requiring consideration is whether irrigation applied to cereal crops will pay. Some experts declare it will not pay, that irrigation is only applicable to intense culture. The cost of providing the supply, and of distributing it over a large area, prohibits its use for cereals. This may be true with respect to the expensive irrigation works in Victoria and some of the other colonies, where the cost of reservoirs, pumping machinery, channels, flumes, weirs, and floodgates, combined with salaries of engineers and carriers, have almost ruined the companies and trusts controlling the works. Of irrigation by gravitation from our flowing wells they can have had little experience; and it is only lately, from experiments made by the Government of New South Wales at the Pera settlement, that engineers have admitted there is a possibility of this method of irrigation proving a financial success. My own convictions, based upon the results of experiments personally directed, is that only by irrigation can the wheat crop in our dry climate be ensured year by year, and that the extra cost of providing the water and applying it to the crop is more than balanced by increased productiveness. The settler, whether he be grazier or farmer, who selects a farm on the downs in the neighbourhood of Barcaldine, must fence his selection and make some provision for supplying water to his stock. The old plan of excavating a tank has been discontinued altogether in favour of boring for water, as in this favoured locality the artesian supply can be tapped at from 700 feet to 1,200 feet. A cash expenditure of £500 will ensure a constant and good supply of water more than sufficient for all stock likely to be kept on the farm, and allowing for a daily output of some half-a-million gallons for irrigation. The bore put down on the highest point of the farm pours out its unceasing flow into a basin from whence, by drains easily and rapidly constructed by plough and delver, it is conveyed to the land requiring to be irrigated. The method of applying the water is by flooding the surface or soakage of the soil by means of furrows 4 feet or 5 feet apart. The last-mentioned method seems best, as unless perfectly levelled beforehand the soil interposes slight inequalities of surface which interfere with the proper flooding of the ground, besides rendering the surface liable to "cake" when the water has evaporated. In applying the water, the full stream from the bore passes down the drain, from whence it is drawn off by the plough furrows in five or six streams, each soaking the loose soil on either side as it flows gently through the whole length of the cultivation. One man with a shovel is required to attend to the work of irrigation, and this is the only expense after first outlay. It may not be necessary to irrigate the crop more than once; but in this climate there seems to be a distinct gain in giving the field a second saturation at the end of winter. Five and a-half acres harvested yielded last year, 29 bags of wheat. Where a portion of the field had received an extra application of water, the yield was much greater, and by a judicious irrigation there seems to be no reason why the grower should not be able to reap at least 30 bushels to the acre. When it is remembered that downs country ready for the plough can be selected at rentals varying from 2d. to 6d. an acre; that horses can be bought for £4 a head and do their work on the native grasses of the country; that by the use of modern labour-saving appliances the cost of production is considerably lessened, it would seem that the difference between the value of the crop elsewhere without irrigation and that produced here by the use of water is more than sufficient to pay interest on the capital required to provide the water and the extra labour necessary for its application to the crop.

If wheat-growing is to become an industry of the far Western districts, settlers must first provide the water supply or obtain it through the enterprise of those willing to expend capital in this direction. The farmer in the south paying high rent for his land, in many cases having to spend months of labour in clearing a small portion of his selection, and dependent upon a capricious rainfall whether he has a good crop, or a bad crop, or no crop at all, may be excused for contemplating with some degree of envy the happier lot of the farmer in the west of Central Queensland, who, having an artesian well to aid him, can regard with perfect serenity those periodical droughts which have done so much to retard the progress of agriculture not only in this colony but throughout Australia. There seems to be no reason why the wheatgrower of the future, having the two essentials in good land and abundance of water for irrigating, should not become as independent and prosperous as the grazing farmer. The grazier's work is that of supervision with an occasional spell at the drafting-yards. The modern wheatgrower on a fairly large scale, has little to do after the crop is in the ground until harvest time, and modern machinery has lifted the burden from the shoulders of the labourer in this direction. When the harvest is over and the wheat is sold, the grower is as free from care as the grazier after his wool is despatched to market. In years to come we may confidently anticipate that irrigation by artesian water on a large scale will have successfully solved the problem of how to sustain close settlement on our Western lands. (Applause.)

In reply to questions put by Messrs. W. Deacon, W. D. Lamb, W. R. Twine, and others, Mr. CAMPBELL, among other things, stated his land was only ploughed and cross-ploughed. The only cost of the irrigation to his land was to let the water in and run along the furrows. His yield last year had been 29 bags from $5\frac{1}{2}$ acres of land. The wheat, all of the Allora Spring variety, went 62 lb. to the bushel, and he had disposed of it all for seed purposes at 6s. 6d. per bushel. It had been pronounced by a miller as good milling wheat, and he had been offered 4s. 6d. per bushel at Rockhampton for 200 bags. Fencing in his district cost about £26 per mile. His land was not subsoiled, nor was it drained. In height his wheat varied, but the straw went as high as 4 feet, and plenty of it was 3 feet and 3 feet 6 inches. The success of the crop depended entirely on the water supply. With regard to the supply of water from artesian wells diminishing, he only knew of three cases where this was occurring, and they were probably due to defective casing. Emerald was 165 miles from the coast, Barcaldine 358.

Mr. J. E. NOAKES (Maryborough), after remarking that he was glad to hear there was some good land in the colony besides on the Darling Downs, said he was seeking information, and desired to know how much flour 2 bushels of wheat would produce. A miller had told him that 2 bushels of wheat in South Australia would produce 100 lb. of flour. He had also been told that in other places 2 bushels of wheat would only give 80 lb. of flour. Did the quality of wheat vary like this?

Mr. W. D. LAMB (Yangan) said the theory of getting 50 lb. of flour from a bushel of wheat was a myth. He had never heard of it being obtained in any part of the world, and, in fact, 40 lb. to 43 lb. to the bushel was as much as was generally got, and then the yield was nearer 40 than 43. In reply to Mr. Scholefield, Mr. LAMB stated that if a man got his own wheat gristed he generally got back in return about 57 lb. of flour and bran. There was usually about 3 lb. out of the bushel that went in waste.

Mr. A. MACFARLANE (Rockhampton) had been very pleased to hear Mr. Campbell's paper, and if it only had the effect of calling the attention of Southern farmers to the possibilities of wheatgrowing in the western districts of Central Queensland it would have answered a very good purpose. Experts, such as Professor Shelton, had assured them that Central Queensland lands west from Emerald were of the finest quality for wheat, and had predicted a great future for the industry there. Judging from the experience of Mr. Campbell and others, and considering the vast extent of these magnificent Western lands, the predictions had every probability of being verified. He had travelled all over both them and the Darling Downs, and could assure the gentlemen present that if the Darling Downs were dumped

out in the Western country they would be lost. This year they expected a comparatively large area under wheat in Central Queensland, as several farmers from Victoria had put in a big acreage, and were very hopeful of the result. There was out West an abundance of the finest land in the world for wheatgrowing—land which could be had at a very low rental, land ready for the plough, and on which there was no such thing as grubbing and stumping. Considering the attention that was now being drawn to it, and to the encouragement that was being given to agriculture by the Government, he had every hope in the great benefits that the growth of wheat would bring to Central Queensland.

MR. T. A. BROMILEY (Pialba) asked if wheat could be grown all over the Western Downs? Could artesian water be obtained all over it? He had been particularly pleased with Mr. Campbell's paper, as he knew Queensland was hardly on the fringe of her resources. The starting of wheatgrowing experiments out West was a step in the right direction. An important point in wheatgrowing was the getting of the product to market, and low railway freights were essential. Personally, he would like to see the railroads like any other roads, and that was—free.

MR. W. H. CAMPBELL said on the Peak Downs surface water was available. At Emerald there was no artesian water, but west of the Dividing Range all was artesian country. About Barcaldine water could be obtained at shallow depths, but further west deeper borings had to be made. Boring, however, was much cheaper now than when the first bores were put down. Generally, there were two supplies from artesian bores. The first, obtained at comparatively shallow depths, was strongly charged with soda, and this was fatal to plant life. The second supply, on the other hand, was perfectly pure and free from all traces of mineral matter.*

MR. W. DEACON (Allora) was glad to hear that a start had been made in the cultivation of wheat in Central Queensland. The more wheat was grown in a country, the more would the science of growing it be understood, and all appliances for dealing with it would also be better understood. They had been told Queensland would soon be a wheat-exporting country, and the sooner the better. He really did not know whether it should be necessary to have to irrigate for wheat. Wheat, as they all knew, did not require much rain, and, as long as it could be got to ripen, perhaps the less rain the better. This last season at Allora, their wheat had not been so good as hitherto, largely owing to the fact that they had had too much rain. He had seen wheat sown on land that was in good tilth, had got a good wet subsoil, and was fairly moist on the top, give a good crop without any rain at all. Of course on heavier lands more rain was required than on friable soils, but he understood the Western lands were of this latter description. The soils on the Darling Downs were generally very heavy, on the contrary, and once they get thoroughly dry they required a good deal of rain to render them fit for successful wheat culture.

MR. P. McLEAN remarked that if forty years ago a man had said wheat would grow in the districts referred to by Mr. Campbell, he would have been looked upon as a madman, but after travelling all over South Australia, Victoria, New South Wales, as well as the district under discussion, he (Mr. McLean) had not the slightest hesitation in saying that this latter, in the not far distant future, would be the great wheat-producing part of Queensland, if not of Australia.

MR. W. D. LAMB (Yangan) stated that if wheat was produced successfully in the land around Barcaldine, &c., low railway freights would be essential for its profitable transit to port. He had heard and read a lot about the land in the West, and had no doubt it would become a great wheat district. He was

* The Lower Cretaceous or water-bearing strata nearly reach the surface at Pine Hill, 100 miles east of Barcaldine, and there are at a depth of 1,000 feet. Further west, at Muttaborra, the water-bearing rocks are found to extend to 4,000 feet.—Ed. Q.A.J.

not a particularly old man, but still remembered the time when it was asserted that the Darling Downs would never be a wheat country; but he thought they had succeeded in proving the contrary, and that wheat could be made to pay providing there was a reduction in the railway rates they had heard so much about. Like Mr. Deacon, he thought the sooner Queensland became a wheat exporting country the better for the growers and the colony.

Mr. McLEAN, in reply to a question, stated that he had seen at Barcaldine, near to Mr. Campbell's place, artesian water applied to a garden within 30 feet of the mouth of the bore, and with the most beneficial results.

Mr. A. H. BENSON, after remarking that he was practically a new chum in Central Queensland, stated that they doubtless knew the Agricultural Department was starting an experiment station close to Emerald. From what he had seen of the country about there he believed it had great possibilities for wheat culture. They had plenty of good land that was admirably adapted for the cereal, but, in his opinion, the question of the successful growth of wheat depended there more upon the thorough cultivation of the land than upon anything else. Deep working, constant working, and the growing of the right wheats would probably ensure the success of wheat cultivation in the district mentioned in three seasons out of four. The Department had only just started at Emerald, but as soon as the place was in full working order it was hoped that they would be able to produce wheat, and wheat of a high grade of quality. He agreed with Mr. Deacon when that gentleman said it was a disgrace a colony like Queensland should only be producing just one-third of the wheat that was required for the bread of their own people. Wheat was the staff of life, and they should be able to produce enough for their own consumption, and in order to do that they would have to develop the wheatgrowing lands of the colony. He had not had any personal experience of the country as far out as Barcaldine, and he had unfortunately not been present during the reading of Mr. Campbell's paper, but he could endorse what Mr. McLean had said about the value of certain artesian waters for agricultural purposes. He was one of the first that took up the working of artesian water at the Pera Bore, in New South Wales. The district around this bore was a dry arid district, but through the medium of the artesian water they were able to grow good crops of vegetables, cereals, fodder plants, &c. Irrigation, however, to be profitably carried out, required a man to use his brains. To be of any practical use, water put on to land should be put on properly. As he stated at Gatton last year, he (Mr. Benson) said the secret of success in irrigation in hot districts was to apply the water at the right time, and when it was on the soil it should be kept there by cultivation. In that way crops could be grown that could not be raised otherwise. The most important question in connection with irrigation, however, was the actual cost of the application of the water as compared with the returns from the irrigated land. There was not the slightest doubt but that irrigation would produce crops, and good ones, but the question was whether it paid. He hoped it would, but it would be well not to be over-sanguine. In California his experience had been that the irrigation of wheats by water had not paid. Irrigation only paid where the crop grown was of high intrinsic value. The cost of getting the water on to the land in the case of many crops, such as wheat, militated against successful results. They were able to grow the wheat, but when the balance-sheet was made up, it was against the farmer. He stated this simply to show that to use irrigation it should be used systematically. It should be employed as an adjunct to their natural water supplies and to thorough cultivation of the soil. By a combination of all three, wheat could perhaps be grown profitably. With regard to the question put by Mr. Noakes, the speaker stated certain wheats would give from 40 to 43 lb. of flour to the bushel of wheat. Others, again, were heavier in the bran, and would not give anything like that return: 70 lb. of flour to the 100 lb. of wheat meant a good milling wheat. A wheat that went below that was not considered a good milling sample.

Mr. J. HUDSON, of Rosewood, then read his paper on—

SOME OF THE DISABILITIES OF FARMERS.

Want of capital is one of the disabilities of farmers, and one that has paralysed and crippled his efforts up to the present. Ninety per cent. of the farming settlement of Southern Queensland was by poor men, and their iron wills and strong arms have done wonders; but to bear the expense of taking up land, then to clear and fence it, buy implements and horses necessary to bring his selection into a state of cultivation, and cattle also to stock it, and at the same time feed and clothe a family, is a task Hercules and such as very few could accomplish without getting involved—a task, perhaps, that no country or Government is justified in expecting without help. Thousands know, to their sorrow, how they have had to pay through the nose for a little accommodation. Further, if farmers could have obtained money at a moderate rate of interest, farming matters would be in a very much further advanced state in this colony than we see them to-day. I think when money can be obtained from the old country at such a low rate of interest, and while it is being imported for municipalities, meatworks, the sugar industry, &c., a point might have been stretched and a little more imported in the interest of small farmers. I know some will say—“Keep away from class interests”; but I think this matter should not be called class, because if the matter of cheap money helps to make the farmer prosperous, then he, in return, will help to make everybody else prosperous. But if the farming industry languish, then every other industry will. I do not look upon this matter as one for co-operation among farmers. Doubtless they could do much for themselves in that direction; but no authority could obtain money so rapidly and cheaply as the Government, and no other authority could work out and manage an affair of that sort so well.

Mr. T. WHITELEY, of Coowonga (Rockhampton), then read the following essay on—

OUR COUNTRY ROADS.

In my opinion the state and condition of our country roads should be of vital importance to all members of the farming community, no matter what particular branch of the industry they may follow. That the very opposite state of affairs exists is fully verified by the small proportion of the votes recorded at our divisional board elections as compared with the number of ratepayers. At each meeting of these boards, a lot of time is occupied in considering correspondence relating to the bad state of the roads. If this correspondence were properly analysed, I venture to say that a large number of the complainants would be found to be people who had not troubled to record their votes, and very likely had not even paid their rates. There appears to be amongst ratepayers a universal craze for the reduction of rates and valuations, but worse still, in my opinion, is the disgraceful manner in which some appeal cases are allowed to go through the appeal court. For instance, a case which occurred in this district a few years back. A certain landowner leased a piece of property, the lessee to pay the rates. This gentleman appealed against a valuation of 10s. per acre, and swore in the witness-box that the property was not worth more than 7s. 6d. per acre. A short time afterwards the board desired to open a road through a portion of this same property, and approached the owner with a view to purchase. The lowest sum asked was £5 per acre. To all outward appearance no effort was made to prevent the appeal from being upheld, neither has any attempt been made to have it altered since, as the same property is paying rates on a valuation of 7s. 6d. per acre while all the neighbours around are paying on 10s. There were no improvements effected by this road to enhance the value of the property, nor did the road in any way depreciate the value of the remaining property. This is not the only case; but such cases occur again and again, and, to all appearance, little effort is made to alter the state of affairs. And it seems almost impossible to obtain witnesses against an appeal, as almost all the people around are only awaiting an opportunity to go and do likewise. In my opinion this policy of reducing valuations is suicidal, as it simply amounts to depreciating the value of their own property. Is there any wonder

that we have bad roads under such circumstances? I think not. Moreover, these people are the very people who make the most noise about the terrible state of the roads. It has been suggested that residents along by-roads might combine and repair their own roads, and so assist the boards. Except in very extreme cases, I cannot agree with these suggestions. These people are paying for their roads to be attended to, and to expect people to pay for work being done, and then leave them to do the work themselves, seems to me to be unreasonable. Farmers, as a rule, have more than enough work to attend to their own particular business without road-repairing, and the boards, having trained men and proper appliances, are in a position to do the work much better, quicker, and cheaper. It is a very common practice amongst people suffering from bad roads to lay all the blame on either the members of the board or the superintendent, when, as a matter of fact, the bulk of it lies at their own door.

This idea of reduced rates and valuations appears to me to be penny wise and pound foolish. If the money is not provided for keeping the roads in good repair, it will need to be provided in larger sums to meet the extra cost of horseflesh, harness, and vehicles; and in proportion with the bad state of the road so will the extra cost of wear and tear be. In my opinion it would be far cheaper for all country residents to pay on a fair valuation sufficient rates to put and maintain all roads in real good order. We should have a high rate fixed at first, which would enable our boards to have all the roads put in first-class order, commencing where the most traffic is, and bringing all the work along as quickly as the means would allow. As soon as a certain length of road is in order—say, ten, fifteen, twenty miles, or whatever may be thought suitable—we would let the maintenance of it by tender for a term of years, giving preference wherever possible to a resident of the locality who travels the road, and will thus have a personal interest as well as a monetary one in keeping the road in good condition.

It appears to me that by following these lines we would, in the course of a comparatively short period, have only the maintenance of our roads to attend to and pay for, instead of as at present making a road, then leaving it until it is impassable, and then make it over again. It would also save a lot of waste energy, and most likely save the use of a lot of profanity. A large amount of trouble on our roads is caused by allowing the drains to choke up and overflow; by this system of maintenance the contractor would, for his own interest, see that all drains were kept open, and the water confined to its proper course. As soon as any part of a road began to show signs of wear, it would be attended to on the principle that a stitch in time saves nine. It may be said that the contractors would not take sufficient interest in the work to follow it so closely. I think they would, if only to save themselves work; but should they neglect it, the people would soon complain, and it would then be the duty of the board to see that the work was done. At present complaints are very often in vain, as the whole available strength of the board is employed elsewhere, and probably at some worse place or places; the result being that the place gets from bad to worse, and when a party is sent to do the work they have four or five times as much work to do as there was when the complaint was first made. A lot of good might often be done by the board's superintendent seeking information from residents along the different roads, as these people might often note circumstances which if known to that gentleman might save a lot of labour and expense to the board. These persons being always on the spot have opportunities for seeing things which it is impossible for the superintendent to see. There is just one other matter I would like to mention. The roads within the jurisdiction of our municipal and borough councils, where they approach the boundaries, are, I think, in a more deplorable state than our divisional roads. One of the most popular ways of holiday-making by our townspeople is by taking a run out into the country, and, in my opinion, it would be far better for the community in general if both town and country

would abolish this niggardly system of doling out their rates in a sort of half-protesting fashion, and very often only under compulsion, and enable their respective bodies to place all the streets and roads in such a state that it would be a perfect pleasure to travel over them, and I feel confident that the cost would not be near so much as the cost of wear and tear and the loss of time and temper.

Mr. F. BYTHEWAY (Gympie) stated that the Divisional Boards Act made provision for the maintenance of roads, and Mr. Whiteley's paper appeared to reflect somewhat on the members of the various local authorities. When there was sufficient population and property, there would be no difficulty in attending to the roads in a district. Everyone deplored the inferiority of many of their roads, but, as property increased, the remedy would find itself. He believed there was provision in the Act to prevent the under-valuation of properties. The question of roads was a very large one, but he did not see what they could do in the matter. There were grants to local authorities, and, as these were all that could be afforded at the present time, he thought they would have to make the best of them. The money available should be spent in the most intelligent way. Country roads were a difficult matter to local authorities, and the only way that he could see to get out of it was by increasing the rates. To do this, power would have to be obtained from the Government, and then the rating might become oppressive. In fact, he was glad power was withheld from the local authorities to increase their rates beyond a certain limit.

Mr. F. W. PEEK (Loganholme) said Mr. Hudson, in his paper on "The Disabilities of Farmers," had confined himself chiefly to the monetary difficulty, and in doing so had advocated a system of cheap rates of interest. In this the Government were to be asked to consider a scheme by which farmers could receive money at low rates. This was a matter that had been discussed all over the country, and there was not a debating society that had not taken it up. Personally, he (Mr. Peek) had come to the conclusion that cheap money would be a bad thing for the colony at large. Wherever cheap money is, products have to fall. It should be their aim, on the contrary, to establish higher values. Generally speaking, those who are wanting cheap money are those who have great disabilities and encumbrances. Those who had money wanted money to be dear: they wanted to get as much interest as they could. No doubt a great deal of money had been spent in opening up roads, and divisional boards had been placed under great obligations in borrowing money at high rates of interest with which to maintain them. Much was to be said about the construction of roads in districts with special natural features, such as hills, and in which it was questionable whether a better system than the present roads could not be employed. A light tramway, for instance, in some districts would, all things considered, cost less than a road and be much more satisfactory. Such a system would doubtless be advantageous in districts like the Blackall Range. About Walloon the country was very level, and farmers got blocked from bringing their produce to market after heavy rains, and an improvement in the system of highways in such districts was badly wanted. Bridges were an enormous item in divisional board expenditure. In his own division a flood or a fresh was sometimes sufficient to cause enough damage to bridges to swallow up a couple of years' rates. A little more assistance by the central Government in the way of endowment for bridges would be of the greatest assistance to boards.

Mr. P. HAGENBACH (Warwick) considered divisional boards laboured under a great many disabilities in the matter of roads, and he thought the Conference should adopt some resolution asking the Government to assist boards in cases where they had to spend large sums on roads and bridges. Last year in his division they had three floods, and damage was done to nearly all the bridges in each division, the board having to spend over £150 on one particular structure. Such maintenance was a serious drain on the resources of a board, and he thought the Government ought to render more assistance than they did to local bodies so situated. Rates might be increased, but among ratepayers

generally the cry was they were too high already. Personally, he would like to see them higher, as they would then save in wear and tear, horses, &c., and all round it would be for the benefit of ratepayers if the members of the boards could be induced to raise the rates. In the division he represented, the rate was 7s. 8d. in the £, and, although he thought this insufficient, the large landholders in the district objected to having it raised. The destruction of Bathurst burr on the roads was also a source of expense to many local authorities, who, he thought, should be empowered to compel owners of property to destroy such burr on the roads adjacent to their land. The Government could assist divisional boards by the construction of light tramways, something after the style of the Allora Railway, although not so good, and these would be of the greatest value in many farming districts. At present, farmers in outlying districts were not able, owing to the time taken in getting their produce to market, to avail themselves of a temporary rise in prices, in the same manner as a man in close proximity to a railway line was able to do.

Mr. O'KEEFE (Laidley) had had some experience in Divisional Board work, and, like the last speaker, lived in a division with a very heavy road expenditure, there being roads every quarter of a mile. He knew many boards, heavily handicapped through excessive road expenditure, the members of which actually valued their own lands higher than their neighbours, in order to set a good example. Members of a board who tried to improve revenue by increasing the valuations would never succeed. In his own district, the feeling among ratepayers was that they were already overburdened with taxation. About Laidley Creek, the average valuation was £10 per acre, and the highest rate that could be struck on that was 1½d. in the £. An increase in the valuation would therefore be very hard on any man who held a quantity of land, and a proposal to do so would meet with strong opposition. The whole question, however, was a difficult one, as some wanted the rates higher and some lower. There was no remedy in the appeal courts. A ratepayer would go into court, and there could get neighbours to bear out his statements. A valuator, on the other hand, could never get another ratepayer to confirm his estimates. In his division, the members of the Board, in order to save the expense of a valuator, often did the valuing, and of course, as usual, got more kicks than halfpence for their pains.

Mr. W. R. ROBINSON (Toowoomba) considered that the present system of Divisional Board valuation was a farce. What did a great many members of these boards know about land valuation? In Toowoomba, not so long ago, the accepted valuers were a photographer and a clerk out of a drapery establishment. In many boards the valuing was done by the clerk or foreman of works, or some of the members. Perhaps tenders were called, and generally the lowest was accepted, irrespective of who the man was, instead of giving the work to the best man available. A sensible man who has any dealing in land can generally arrive at a fair valuation.

Mr. T. A. BROMLEY (Pialba) pointed out that in valuing land the Act inferred that the agricultural value of the land should be taken. The valuations of auctioneers or land agents were rarely right, and a Divisional Board's clerk was not always unbiassed, and many abuses crept in anyhow. In his own division he knew of a piece of land on one side of a road valued at £90. On the other side an exactly similar piece was valued at £220. In the matter of allowing higher assessments, personally he would be glad to accede to it, provided it fell on others equally, and provided the expenses of office management did not increase in a like ratio.

Captain HENRY (Lucinda Point) thought Mr. Peek had mentioned the solution of the matter in his remarks on roadways. In the North, tramlines were their great hope. In his own district they had already constructed over thirty-six miles of tramlines at a cost of from £500 to £800 per mile, and they were making arrangements for the construction of an additional eighteen miles. There could be no doubt that, in the long run, tramlines will be by far the cheapest kind of road they could get, as the cost of maintenance was so

small. In the matter of cheap money, he disagreed with Mr. Peek altogether, as he considered that, though cheap money would mean cheap production, it would not necessarily mean a lessening of the price of the product. The more money there was about, the greater the purchasing power of the people. Cheap money was already procurable in many European countries, notably Italy, through the medium of farmers' banks, and, so far as he could gather, these banks were doing inestimable good.

Mr. W. M. DEACON (Allora) said in regard to the discussion on roads two points had been missed, and these were the local authority in one generation had to make roads for all generations, and in the next place they were retrenched three years ago by the Government. Civil servants retrenched at the same time had had their reduced emoluments restored, but not so the local authorities. The boards used to get £1 for £1, at one time £2 per £1—by no means too much—but now they were down to 4s. in the £1. He thought the endowment should be restored to something like its old dimensions. In other countries, instead of retrenchment, increase in endowment was the order of the day. In fact, in England, one-thirteenth of the whole revenue was going in endowment to local authorities. This endowment (some £8,000,000) was obtained from Customs, Stamps, Excise, &c., and was guaranteed to the local authorities. The only extra special item local bodies had to bear in England was the police.

Mr. T. E. COULSON (Rosewood) lived near to the Walloon district, and could bear out what Mr. Peek had said about the difficulty farmers experienced there in getting their produce to market during wet weather. In the Rosewood Scrub the farms were very small—few of them exceeding 100 acres—and this meant a network of roads in the district. In the scrub, again, good road-making material was very scarce, the total result being that road maintenance was a big source of expenditure there. On the other hand, out from the scrub, in the forest country, road-making was less costly. Taking these facts into consideration, he thought the Government should provide for a system of differential endowments to local authorities. With regard to bridges, he mentioned the case of a bridge in a division adjoining his own, and which was used mainly by people from the Rosewood Division. It was a bridge on the main stock route, and was used by all the cattle from the West. At present it was broken down, and as the people in whose division it was never used it nothing was being done to it. Even if the Rosewood Board did attend to it, the repairs would absorb a year's rates. Such bridges should be under the control of the central Government. He differed from Mr. Peek in the matter of cheap money, and supposed that gentleman had never been forced to pay through the nose 10 per cent. for an advance. He knew one man who had had the pluck to take up a farm nine years ago on the side of a mountain, and who at the present day had to collect his maize crop with a basket. He had not repaid a penny of the principal of the loan he had obtained at the start, but had paid 8 per cent. interest every year, crippling himself in the doing so. There were many men who took up land in different parts of Queensland, and whose only crime was poverty. He thought it would be to the interest of the colony if the Government assisted those men with money at cheap rates of interest.

Mr. E. SWAYNE (Mackay), in giving examples of the value of cheap money to farmers, mentioned the Drainage Act of Great Britain, passed fifty years ago, and which had been the means of putting a great deal of otherwise waste land under cultivation. The marked increase in the area under sugar in Queensland this year was mainly due, too, to the operation of the Sugar Works Guarantee Act.

Mr. W. R. TWINE (Wallumbilla) referred to the marsupial pest as one of the difficulties farmers had to contend against in Queensland. Here, too, was a case in which cheap money, to enable them to buy wire netting, would be of the greatest benefit to farmers, as it would permit them to set about enclosing at once without having to depend on any arrangements that might be made

by their neighbours. With regard to the experimenting in different products, he took it this was really the province of the experiment farms. Conditions of soil were so different. The Maranoa district, he believed, was similar to the western lands of the Central district, but in the former they had no artesian bores, and the contour of the country would not permit of irrigation except at immense expense.* Dry seasons were certainly to be included among the disabilities of farmers, and in the Maranoa district their only refuge was in deep cultivation, subsoiling, &c., although these had hitherto been adopted in only a few cases. Where they had been carried out, however, most beneficial results were seen in dry seasons. He had seen land subsoiled to a depth of 15 inches yield 15 bushels of wheat to the acre, while the crop on land alongside, and not treated, was not worth harvesting. Personally, he had proved that a small area of land in that dry region was more profitable than a large area given only shallow cultivation. Shallow cultivation in such a district was simply throwing money away. For the last three years at Wallumbilla they had never had enough rain to soak 3 feet into the subsoil, and since last January they had never had more than three-quarters of an inch of rain at a fall; in fact, the district when he left it was far from what it ought to be, and coming to where they then were, where there was plenty of moisture, the contrast was very marked. He thought light tramlines would do very well in level country, but in districts like Rosewood, where there were so many by-roads, there would be objections to them. Arrangements would have to be made at the various junctions for transshipping. Then the question of bridges would come in, as good structures would be essential. However, if the Government could be induced in the direction of a differential endowment the difficulty in that respect might be met.

Mr. SANDROCK (Bowen), after stating that he thought all agricultural implements and machinery should be admitted into the colony duty free, referred to the injuries done to farmers through the fruit fly and other insect pests. Some means ought to be adopted to bring about combined action for the keeping of these in check, as individual effort was powerless. It was useless for one man to fight a pest while his neighbour did nothing. In the matter of roads he agreed that in large straggling districts the keeping of them in order was a serious matter to divisional boards after floods, and especially since the endowment had been retrenched. He, too, advocated an increase in the endowment. Railway freights were not the serious question in the North that they were in the South; but he was glad to say steps were being taken for the export of fruit to England, so steamer freights and storage would soon have to be dealt with. He himself had sent mangoes to London, and though he had been promised they would be stored in the cool chamber he found afterwards they had gone as ordinary cargo. Needless to say on arrival in London they were quite rotten.

Mr. C. MARKS (Kolan) pointed out that in considering the roads question it was important to remember that many country roads ran through Crown lands.

Mr. J. HUDSON (Rosewood) desired to know if it was inferred that those who wanted cheap money were involved.

Mr. F. W. PEEK: No, no!

Mr. HUDSON replied to the remarks made upon his paper, and concluded by stating that farmers had to produce cheaply, and that he saw nothing wrong or impolitic in trying to get cheap money from England for agriculturists here.

Mr. T. WHITELEY (Rockhampton) stated that in his paper he had no intention whatever of reflecting on members of divisional boards or magistrates of the appeal courts. He was of opinion that the ratepayers were to blame for faults in that direction, and he had no desire to call on the Government for further assistance. If the rates were put up,

* Bore at Muckadilla, forty-five miles from Mitchell. Water-bearing strata come to the surface at Dulacca, and reach 3,262 feet at Muckadilla.—Ed. *Q.A.J.*

the result would be an increase in the endowment; and as for the rates becoming too high or oppressive, he had pointed out that the extra money paid in rates would be more than compensated by the decrease in the wear and tear and loss of time caused by bad roads. Stopping every mile or so on a road to repair some breakage to harness or vehicle, as had to be done not unfrequently on many country roads, was far more oppressive than paying a slightly higher rating. Allowing members of a board to do the assessment might save a few shillings in valuers' fees, but it did not seem to him a wise proceeding. He had known members of boards who had been the means of having their own rates reduced. Such men were few, but still they existed. As for valuations themselves, he believed they should be fair, neither too high nor too low. It was a pity they could not find some means by which ratepayers would give their own valuations, and if they were not considered high enough the ratepayer should be compelled to sell at his own valuation, the division getting the surplus if there was any. In his opinion there were many questions in which divisional boards had insufficient power, but he believed this was being remedied in the new Local Government Bill to come on next session. As for roads, the power was in the hands of the ratepayer, and if the ratepayer did not take sufficient interest in the matter he would have to continue to put up with bad roads.

Mr. CHATAWAY said that although the reader of the paper on roads had stated that he did not desire further aid from the Government, still, from the remarks that had been made, it was evident that an increase in the endowment to local authorities would be very popular. It would be well to remember, however, where that endowment came from. It came from their own pockets. The central Government had no special fund, no stream of money, from which they could take endowment and present it to the boards to spend. The question really resolved itself into this: Whether they, for the further improvement of their roads, should take money out of their own pockets, or allow the Government to take it out and hand it back. That the Government should take it out of their pocket and then hand it back, seemed the most popular idea of the two, although it seemed to him there might be some waste in the transaction. If the Government increased the endowment, the money would have to come from somewhere, and if, to find it, it was proposed to increase taxation, say by reimposing duties on farming implements and fencing wire, many might hesitate before pressing their application for increased endowment. There was no doubt, however, that the local bodies did want more money. With regard to cheap money, that was a question to which he had given as much attention, he supposed, as any man in the room, and he could say that it had been proved without a doubt that in those countries where the banking facilities have been especially great, and where money has been especially cheap, of itself, with no other controlling influences coming in, the debt of the farming population has increased. This has been the case in Switzerland, where banks are established all over the place; and, indeed, they all knew what had taken place in Queensland ten years ago. Money then was especially plentiful, and they all remembered how deeply thousands of people had got into debt. In fact, it could safely be laid down that, of itself, the supply of cheap money added to the indebtedness of a country. The gentleman advocating cheap money had also, however, desired that it should come through the Government, and Captain Henry had mentioned the success of agricultural banks on the Continent of Europe; but, although the speaker did not wish to argue out the whole subject, he wanted to point out that where those banks had been successful—and successful they had been without a doubt, having changed the whole face of many parts of Europe—they had been severely left alone by the Government. In Germany, for instance, they had been opposed at first by the State. The successful banks were purely co-operative associations, run by the borrowers themselves. The whole subject was one that required a vast deal of consideration, and he knew that for several years a number of thoughtful men, with whose aims he had the deepest

sympathy, had been trying to work out a scheme that would be of benefit to this country, by obtaining and advancing cheap money, not to be spent in luxury, but in improving production.

THE BEST AND MOST EFFECTIVE SYSTEM OF WHEAT STORAGE.

On this subject, which was brought up at the instance of the Drayton and Toowoomba Agricultural and Horticultural Society,

Mr. R. W. SCHOLEFIELD (Toowoomba) said—

By the erection of elevators or some suitable stores at one or more central depôts on the railway lines, where the farmer can take his wheat after thrashing, great assistance will be rendered to farmers. These stores should be in charge of a Government official, who will only accept good milling wheat—that is, it is no use accepting wheat that is not saleable at the highest market rate current. Let the badly grown or harvested wheat look after itself. We want to assist the good man who assists himself, and establish a character for our wheat, looking forward to the future, when we may be able to ship. If grading can be applied to the wheat so much the better, and let the farmer take away what is rejected. He can grist it for his own use. When the wheat is accepted in the store, a certificate is to be given to the owner for the number of bushels, and he will have to pay storage at so much per month. With the certificate from a competent official, that he holds so many bushels of good milling wheat in a Government store, he will be able to go to his banker or any other person he wants credit from, produce his certificate and a sample of the wheat, and either borrow the money he wants or sell the wheat in store. The purchaser could get a transfer of the certificate, and the grower would be done with it. It may change hands several times before the miller gets it. But it will have the effect of steadying the market and allowing the grower to get his money when he wants it, at a small cost for storage and at no loss to the Government. At the present time the farmer puts his wheat on his dray and goes to market with it. He has no place to store it, and when he draws up at the mill he is told they are not buying. The farmer says, “I cannot take it back, what will you give me?” So a price much under the current value is offered and accepted, and thus the thing goes on.

Mr. W. D. LAMB (Yangan) endorsed Mr. Scholefield's remarks, but also stated it would be necessary to have a good firm man in charge of the elevators, a man who would take nothing but the best wheat and reject anything that was inferior. Having put wheat into an elevator, a man could get a warrant for it, which he could negotiate or get a loan on, or he could deposit it in his bank. Moreover, he would be able to sell the moment wheat had reached its highest value, and this would also suit the miller. As they all knew, most of the wheat grown in the colony was put on the market within four months; and when a miller has to buy within that period enough wheat for the rest of the year, extra items of expenditure have to be reckoned for. The miller, like the Government, has no private gold-mine, and has often to go to his “uncle at the corner” to negotiate a loan. Interest on this and insurance on grain in his store necessitate him lowering the price for wheat, or otherwise it would be a losing game. Anyone who has ever been in a grain store cannot be but surprised at the waste from weevils, mice, and other causes; and if the grain has to be stored for six or eight months, the loss is somewhat considerable. By keeping the wheat in the elevators and extending the sale over the whole year, such expenses would be minimised, and the mill-owner would also be able to work on a much smaller capital, as he would only have to buy from time to time just as much wheat as he required, and, as he sold his flour, he could buy more wheat. Besides getting an increased price for his grain through the improvement of the position of millers, the farmer would be more independent were the elevator system adopted. The wheat would be covered by insurance, and presumably a small rental would be charged for use of the store, current expenses, &c. The system, which would undoubtedly benefit both farmers and the colony as a whole, would also be an advantage in another direction—that is, it would force growers to be more careful with their crop than they often were at present.

Mr. W. R. TWINE (Wallumbilla) mentioned that in one case, in the Maranoa district, a committee had been appointed to receive and store wheat at a very low rate of storage. A certificate was given on receipt of the grain, and the bill was negotiable at the bank, which advanced up to 12s. per bag on it. This was a purely private enterprise, and had no connection with the Government.

Mr. W. DEACON (Allora), in reply to Mr. Hudson, said wheat would not deteriorate in elevators. In bags, of course, it did deteriorate, although a good deal depended on the kind of wheat. Some wheats would keep twelve months without the sign of a weevil—that was, of course, if they were well harvested and got no rain when in the stook. Defiance and Ward's Prolific were varieties that did not take the weevil so much as the soft sorts.

Mr. W. R. ROBINSON (Toowoomba) pointed out that the elevators could be used for other grain besides wheat, and in a big maize season they would be very useful. Malting barley could be also stored in them. He understood the elevators were weevil-proof. In the American system the elevators graded the wheat into three different classes, and issued certificates accordingly, which rendered their negotiation simpler. The whole system was well worthy of a trial in Queensland, and he (Mr. Robinson) said he would like to see a small co-operative company started in Allora, say, to test it.

Mr. F. W. PEEK (Loganholme) said the Wallumbilla people had given an example of what could be done in the matter, and he also advised farmers to try the system. He also wished to know whether it was intended the Government should control the elevators.

Mr. G. F. SANDROCK (Rockhampton) gave some very interesting particulars in connection with his experiments in the keeping of maize. He had soldered maize down in kerosene tins, and although on opening some time afterwards the seed looked perfectly good, yet on planting not a grain of it would germinate.

Mr. CHATAWAY thought Mr. Scholefield's suggestions deserved every consideration, and stated that he believed that, as soon as there was sufficient wheat to guarantee the erection of an elevator, one would doubtless follow. However, before putting one up, it would be well to know whether there was a certainty of its being patronised, as farmers, in the present state of the wheat production of the colony, might not care to use it, especially if it was charged for.

FOURTH SESSION.

THURSDAY EVENING, 12TH May, 1898.

The following three papers were read by their writers:—

THE DAIRYING INDUSTRY AND ITS VITAL POINTS.

[By Mr. JOHN MAHON, Department of Agriculture.]

In dealing with the above industry, I am sure all persons, directly or indirectly interested, must admit that this branch of farming is a great help to settlement, is of the greatest importance to Queensland, and fully demands the co-operation and assistance of all who have the welfare of this great colony at heart. The dairying industry has brought prosperity to the homes of thousands of struggling farmers in the southern colonies, who, before dairy produce was exported, were barely making a living by growing grain on impoverished lands, and selling it at starvation prices, but now that the farmers have adopted a more remunerative method of obtaining wealth from the soil—by growing cereals, putting them into the cow, taking them out in the form of milk, and then marketing them in a more condensed form as butter, cheese, bacon, &c.—I am quite positive that the same state of things will become general here before long. The phenomenal rapidity at which the industry has developed in the Southern parts of Queensland has surpassed the expectations of the most sanguine person, and should give confidence to those about to invest in a business that it is a profitable and everlasting industry. The *Singleton Argus* (New South Wales)

of the 2nd March, 1898, states that a farmer on the Lower Clarence who reaped the magnificent sum of £40 as the result of four years' hard toil in a 20-acre canefield, recently threw the whole business up in disgust and started dairying. To-day, the same farmer on the same piece of land is averaging something like £24 per month for milk, and this is only one instance from hundreds that could be quoted. So much has been said and written about the dairying industry in the past, that it is difficult to find a fresh starting point, and so evade the fault of a repetition of much that I have written or spoken. The first question that to me deserves some consideration is—What are our future prospects in the London markets for dairy produce, or, in other words, what shall we do when our now increasing production exceeds the demand? In answer, I give it as my opinion that our future prospects are good, and that the ever-increasing consumption will more than keep pace with the production, so that we need not fear the future. It only remains for us to use every precaution in producing the very best quality of goods, and always bear in mind that we have to cater for the taste of the English consumer. Assuming for the sake of argument that there may be over-production, it is not, I think, the Queenslanders who will suffer from such an effect, but the Danish people and those of other European countries, where the cost of production is greater than here. No country in the world can produce milk at such a low cost as Australia, and especially in Queensland. Here we have an unlimited area of good lands, from which, for very little, abundance of fodder can be produced. We also have a mild climate, and only require to shelter our cattle for a few months in the year, whereas in Denmark and other European dairying countries the price of land is high, the areas small, and housing and feeding of cattle are necessary for at least nine months in the year thus increasing the cost of production by over four times that of Queensland. In the face of these facts, is it reasonable to suppose that Denmark can compete with this colony? That there is a great future for the dairy farmer in Queensland is undeniable, and within the next few years it is anticipated the value of the exports will surpass those of many of the now leading exporting industries. At present our greatest drawback is the want of population. In Queensland we have sufficient land to carry millions of people, and I see no reason why we should not have a large influx of people from other parts, where farmers and dairymen are barely making an existence, owing to high prices of land and high rents. The farmers of this colony have—it would seem to me—need to regret that co-operative dairying is making such slow progress, due in the greater part to apathy on the part of the people themselves, who allow petty jealousies to interfere with success. With many co-operative associations that are in existence, the organisation is so weak that a good manager is not employed, with the result that these companies are dependent to a great extent on the profit-making agent to finance the business and dispose of their goods, thus violating the sense of the word co-operation. The foundation of successful co-operation is concentration and good management, and if carried out under these principles failures are not possible. Failures almost invariably have been traced to bad management, and small concerns where the farmers themselves, who are not as a rule business men, undertake to manage the financial part of the business. Co-operation amongst a few is really not co-operation at all, and where among a body of farmers some will not co-operate, but supply private persons, they are only furnishing the material to wreck the co-operators to the despite of their neighbourhood. When a business is carried on in a large way the cost of manufacturing is reduced very considerably. Co-operation in the manufacture of the article alone is in my opinion not sufficient; co-operation should extend to the distribution retail in the towns and settlements. Under the existing methods of distribution the produce goes through two, three, and very often four hands (or profit-making agents) before it reaches the consumer, and the expense on each occasion (borne by the producer) may be estimated at from 10 to 20 per cent. Even the butter exported to London passes through two or three agents before it reaches the consumer. In 1896 about 6,000,000 lb. of butter were made in Queensland. Now, assuming that the average price was 10d. per lb., that means a value of £250,000, from which may be deducted for the middleman 5 per cent. (or £12,000), for the retail man (who at least gets 10 per cent.) £25,000—or £37,000 all told; and, as every person knows, the goods very often pass through the hands of three and often four agents before it reaches the actual consumer. The butter exported to London during the last twelve months amounted to 810,880 lb., and the average price was something over 10d. per lb., equal to £33,786 13s. 4d., from which is to be deducted 5 per cent. to the first agent (£1,689) and 5 per cent. to the second—or £3,378 in all—that, under a thorough system of co-operation, would have gone into the pockets of the producers. Are the above figures (which I consider much under the mark) not proof beyond all doubt that co-operative dairying will return to the farmers many thousands of pounds that

are now going into the pockets of the far-seeing profit-making agents. I think the time is now at hand when the farmers should move in this matter, and no longer feed the drones who in the past have feathered their nests from the labours of the sons of the soil. It is unreasonable and absurd to suppose that equal or better prices are obtainable from proprietary companies, or that there is a shadow of a chance of their competing against a well-organised co-operative company. It is unreasonable to think that traders are going to invest capital and work in the interests of the producers for small profits. Self-interest is a law of nature, but should not be so with the dairy farmers. I will not dispute the fact that traders will pay equal, and in some cases more than co-operative companies, for a short period, or until a monopoly is gained, after which the poor "cockey" is roughly handled. Knowing, as the farmers do, that these statements are perfectly correct, who can sympathise with them when they continue to travel in the old groove without any ambition to better their position, or pocket 15 to 20 per cent. of their hard earnings that are now going to feed the drones. It is unwise to entertain the idea, as some people do, that if the producers co-operate the traders will not buy their goods. By the aid of co-operation the agent is completely done away with, distributing depôts would be established in the various centres of population, and the consumers could rely upon getting the genuine article. In Denmark 95 per cent. of the factories are worked on the co-operation system, and the middleman never comes in for a share of the profits. A manager and three assistants sell over £6,000,000 worth of butter yearly in England, thus saving the London commission, which alone would amount to £300,000 at 5 per cent. Apart from the direct gain to the producer under a system of co-operation, there are other advantages to be obtained. It will be to the interest of the producer to exercise every care in supplying the best quality of goods to enable the manager to turn out an article of the finest quality, whereas under the present proprietary system there is no inducement offered—the man who never exercises any care in the handling of the raw material receives just as much for it as the person who exercises every precaution. The proprietary people rightly claim the credit of having done a great deal towards developing the industry in this colony, but have done so in their own interests. Had these traders not stepped in, the industry would, of necessity, have been developed by the farmers themselves, but at a slower rate of progress. The people of this colony have long ago realised the importance of the factory system of dairying, knowing that a good article cannot be turned out in large quantities under any other system; consequently it is unnecessary to deal with the matter here. The following are a few points which I have found to militate against successful co-operation: 1, apathy on the part of the farmers; 2, petty jealousies; 3, interference with the manager and directors by the milk-suppliers; 4, limiting the business to too small dimensions; 5, want of self-reliance. The foundation for a successful export trade has been laid beyond doubt, and although Governments, as a rule, do not obtain credit for what good they do, praise in this instance is due for the help rendered in opening up this trade with London. A bonus was given upon approved butter for export, arrangements were made for shipping space, bad butter was rejected, and good butter carried the Government brand. I am of opinion that the industry requires no more spoon-feeding, and can and will support itself. Too much assistance would, in my opinion, ruin any industry; but I do think that the Government would render valuable assistance by exercising strict supervision over the distribution of Queensland produce in the London market, and in support of this argument would draw attention to the conflicting and contradictory reports that have appeared in our papers in reference to the recent shipments of butter to London. Incorrect and unfavourable reports have also gained currency in the southern colonies, which may to some extent detract from rapid agricultural settlement here. Now, I know a great deal about the recent shipment of butter, and think I can relieve your minds of the idea that bad butter was shipped. In the first place, the Under Secretary for Agriculture and myself inspected and branded nothing but the very best quality, all of which was superior to the shipment per the "Junna" that was so highly spoken of in London. Some samples were rejected owing to the quality being inferior, but I have every reason to believe these samples were shipped as first quality. We have no power to prohibit anyone from shipping goods of the most inferior quality, but really think that power should be given. If the article is inferior, ship it without a brand, or mark it according to its quality. Coming back to the recent shipment of butter, we all know that the producers here are in the hands of the "traders" in England, as well as at this end. All butter is sold privately in London at prices fixed by the buyers, and so to make known the actual results would be contrary to the interests of those

engaged in the agency business ; consequently under existing circumstances we may never hope to get reliable information. I know for a fact that one shipment of butter was supposed to have arrived in London in inferior condition—paragraphs appeared in the papers that prices were low, 86s. to 90s. per cwt.; whereas it is a fact that 98s. and 102s. were realised for this consignment of supposed inferior butter. In the face of this, how can confidence be placed in the reports sent from London? I do not mean to infer that the agents here or in London are dishonest; but I do maintain that human nature has not altered, and it is every man's ambition in this world to make as much money as he can and in as short a period as possible. Too much importance cannot be attached to building up a reputation for our goods in the London market, but I am afraid that we are not quite on the right lines just yet. The English buyers are allowed to fix the prices for Australian butter, whereas the Danish producers fix their own prices. My opinion, although opposed by the proprietary people, is that the Government should have control over the exports of dairy produce. The agents here take the Government brand as a guarantee that the quality of the butter is good, and make advances upon no other conditions. I am quite satisfied in my mind that the buyers in England consider the brand a guarantee for good quality, knowing that no Government would tolerate inferior goods bearing a first-class brand. I could say a lot on this subject, but will leave the matter to be thrashed out by those present. The very great importance of care and cleanliness in handling milk cannot be too deeply impressed upon the dairymen of this colony—indeed, our whole reputation hinges upon this all-important matter, and until compulsory inspection is adopted we may always expect to have a certain amount of inferior butter on the market. The action of one dairyman supplying milk to a factory who disregards cleanliness is sufficient to destroy all the efforts of his more careful neighbours, and prevents the factory from turning out a good article. I think it is very much to be deplored that there is not an Act of Parliament whereby inspectors could be empowered to have control over all sources of milk supply. Under the Public Health Act of 1896, power is given to the local authorities, but I have never known an instance in country districts where the Act was put into force; consequently the Act is useless to the large manufacturers—indeed, under the present sources of milk supply, the manufacturers are at the mercy of the suppliers, and one dirty, careless supplier may contaminate the milk supplied by all others. No article of food is so susceptible to the bad odours, or so absorbent, as milk; and the filthier the conditions and surroundings of the sources of milk supply, the more favourable the home for these impure bacteria. During my travels in this colony, I have seen milk supplied to factories from diseased cows, in many cases in such a condition that the milk was unfit for human consumption, and no means other than compulsion would change such people from their dirty habits. If we wish to uphold a reputation for our goods in the home market, we must induce or compel the milk-suppliers to adopt a thorough system of cleanliness and aeration of milk. Immediately the milk is drawn from the cow, and especially while it retains the animal heat, it absorbs all sorts of impure bacteria that may be in the milking-yards and outhouses, which cause rapid fermentation and render the milk unfit for conversion into a good article. Milk-coolers are so cheap that no milk-supplier should be without one, and all milk should be cooled and aerated immediately it is drawn from the cow, and should be carried out into a pure atmosphere, far away from milking-yards, piggeries, and other bad-smelling outhouses. By adopting this thorough system of aeration the quality of the milk is much improved, especially as foul gases and the animal odour are expelled, which otherwise would be carried away into the cheese and butter. This information, and a great deal more, may be obtained from every pamphlet on "Dairying" issued by the Agricultural Department; consequently there is no need for me to go into the matter in detail, or for any farmer to plead ignorance, for copies can be had on application. I have simply brought the subject up for discussion. I am a great believer in the above process for butter-making, and thoroughly believe that all milk for household purposes should be pasteurised, for by this process the pathogenic germs are destroyed, and the milk is freed from infectious organisms. There are many reasons why the above process could not be successfully carried out at our butter factories or at our creameries. The greatest difficulty to my mind is the want of means for cooling, and in most cases the cream would be too ripe to undergo the process by the time it reached the factory. Another drawback is the want of a perfect pasteurising plant, and at present I know of none on the market suitable for the purpose. In Denmark nearly every factory has adopted the process, but I believe the filthy condition of the yards and the close confinement of the dairy cattle necessitate their doing so. Tuberculosis and other diseases among dairy cattle are wisely occupying the attention of scientific men, as well as many others engaged in stock pursuits. Tuberculosis is not a new disease, but of late years, since the germ of disease was first identified by Professor Koch, greater interest has been taken in

the matter. From Professor Koch's writings we learn that the awful disease is communicable between man and animal, and that thousands of human families have contracted the disease through the careless use of meat, milk, and other dairy products. Now that we know diseased animals are a source of human infection, it is high time that some steps should be taken to wipe it out, and I am quite satisfied that numerous herds in this colony are affected more or less with tuberculosis, and especially among the higher bred animals and herds that are kept on poor swampy country. I would strongly advise those about to build up herds to start by using the tuberculin test from the beginning, and I think the legislators of this colony would bestow a great blessing upon the human being if an Act were passed whereby the dairy herds could be inspected, and all diseased animals destroyed. This, to my thinking, is the only means whereby the disease may be eradicated. We know for a fact that dairymen will not destroy diseased animals unless compelled to do so; and when by force of circumstances diseased cattle are destroyed, they are either fed to pigs or if possible fattened for the butcher. Cancerous cattle are not unfrequently to be seen in milking herds. Although these remarks are brief, they deserve much consideration. In the August number of the *Agricultural Journal* I have written fully on choosing and breeding of dairy cattle; consequently it is unnecessary for me to deal with the matter here. However, I may inform the dairymen that our herds, or at least the majority of them, are unworthy of the name of milkers, and we may never expect an animal to be of a good strong constitution if the calf is badly reared, as is the custom here at present. The farmer appears to think that if life can be kept in the calf nothing more is required; but a calf that is badly reared can never make a good cow. If the farmers of this colony were in possession of good herds, and paid attention to feeding, milk at 1d. per gallon would be more profitable to the producer than it is at present at 3d. per gallon. To be successful, winter feeding must be carried out. In conclusion, I wish to state that I have dealt with each subject as briefly as possible, but hope that discussion will be raised on any subjects mentioned in this paper. (Applause.)

THE DAIRYING INDUSTRY.

[By Mr. T. E. COULSON, Rosewood.]

The dairying industry is engaging the attention of a large number of the farmers and dairymen of the colony at the present time. Previous to the factory system, in the summer months we thought it a good price to get 5d. per lb. for butter, and sometimes as low as 2d. was all you could get. Such prices, as you know, held out no inducements to people to go into the industry, but, under the factory system, we not only get much better returns for our labour, but produce an article more fit for human consumption; consequently there is double the amount consumed. As may be anticipated, the production of the colony will overtake its consumption. Then we are in a position to compete with other countries on the world's markets, and the prices we have received lately for butter sent to London—viz., £4 14s. and £4 16s. per cwt.—are very encouraging. Already many people who formerly used to grow other products, such as hay and maize, for market—the low prices they received for which, left no margin of profit—have found it to their advantage to go into the dairying industry, which has been the salvation of many small farmers of Southern Queensland. The Government is repurchasing large estates and cutting them up into small holdings, thereby encouraging a producing population which must ultimately increase the productions of the colony. To successfully carry on dairying, we must not lose sight of the fact that we want milking cows which are not within the reach of every farmer. Many that we milk now go by the name of cows; but when you look at the bucket, a better return ought to be got from a goat. But by judicious culling and mating the best of the cows with a pure-bred Ayrshire or Jersey bull, in time you may work into a fairly good dairying herd, as in the first cross there is decidedly a great improvement. Winter feeding is a matter that many of us have neglected to our sorrow, but experience has proved to us without a doubt that if we let milking cows get down in condition in the winter, they are not nearly so good at next calving. Supply to creameries is the mode by which the majority of farmers and dairymen dispose of their milk. There it is separated, and the skim milk returned to you to feed pigs and calves. A sample of your milk is retained from every supply for testing, as according to the percentage of butter-fat the price is computed. Here friction often arises between milk-suppliers and the managers of creameries. It is due to want of knowledge on the part of suppliers how to accurately test the milk they supply. Permit me to suggest that the Department of Agriculture might initiate the farmers and dairymen, through the medium of the *Agricultural Journal*, into the art of testing their milk. By doing that it would supply a long-felt want. The security of cream during its transit to the manufactories

is a source of very serious complaint, which in many cases involves serious loss to suppliers. The manufacturers attribute the deficiency to the inaccuracy of the weighing machines on the railway. That state of affairs could easily be remedied by a thorough system of testing the machines of the Railway Department. Amongst other things they complain of is the way in which the cans are knocked about and the locks broken off, which results in a loss of cream. Another improvement could be effected—one which the dimensions the industry is assuming would justify—namely, a special car to convey cream to the metropolis. At present the cream is carried with many other articles, and that militates against the manufacturer producing a good article, causing, of course, a loss to the producer. The manufacture and distribution of butter at present are not satisfactory to the producer. The manufacturer is the distributor in nearly every case. He is paid to make the butter, and then he receives a commission of $2\frac{1}{2}$ per cent. for handing it over to himself. Then, should the local market not be in a position to receive it, he exports it, for which he gets a bonus of 2d. per lb. from the Government, which, of course, is supplied by the producer under the Meat and Dairy tax. As it may be expected we shall soon be in a position to export in large quantities, it is very necessary our butter should be properly placed on the market. Some of us have had bitter experience of forwarding our produce for sale on the markets in our own colony. It is just as likely that our own salesmen are as honest as in any other part of the world; but it is only natural that they will obtain their goods at the cheapest possible rate. To be on an equal footing with other continental countries, which have their agents to see that their butter and other products are placed on the market to the advantage of the producer, I would suggest that the Agent-General for the colony should have a proper staff at his command to carry it out. The result would give a stimulus to the industry and prosperity to the people engaged in it, and the colony generally. (Applause.)

CANCER IN CATTLE AND ITS EFFECTS ON THE CONSUMER.

[By Mr. W. A. A. BATES, Maryborough.]

The subject with which I have to deal is one of all-absorbing and vital importance, not only to stockowners and breeders but to mankind at large. The increase of cancer and the large death rate attending its ravages is attracting the serious attention of medical men. There is no doubt efforts should be made to find out the cause of this great mortality. There is a standing opinion that it is to a great extent caused by eating cancerous meat or drinking milk drawn from cancerous cows. My intention is only to read a short paper on what I have seen, and state what I think has a great deal to do with the cause and effect. It has come under my notice that cancer runs more in some strains or families of cattle than in others. For instance, a cow may produce a calf that will appear quite healthy, but in the second or third generation cancer, which must have been lurking in the blood of the mother or, perhaps, the sire, will break out again. I think it is beyond doubt that it lurks in the blood, and then by some aggravating cause it breaks out. Cancer will come from a blow or a horn. Sometimes the brand will become a cancer. Other times it will come without apparent cause in the eye, the nose, the udder, but it comes nevertheless, I believe, from being inherited. I have no hesitation in stating that cancer in dairy herds is decidedly on the increase. Now we hear almost every day of persons dying from cancer, and no cause can be assigned for the terrible malady. I am strongly of opinion that if the progeny of cancered cows can be affected, as they have in cases which have come under my notice, the milk from cancered cattle will have the same effect and assist in the development and increase of the disease in the human race. In support of my assertion I refer you to the cases of typhoid which broke out recently in Brisbane, the effects of which are painfully fresh in the memories of the families of some of the unfortunate sufferers. The cause was clearly traced to the milk which came from cows that were allowed to drink stagnant water around Brisbane. If the infection can be carried in the one way, it is a certainty it can be carried in the other. Cancer in cattle is not so easily detected as some persons would imagine. I am perfectly aware that plenty of persons do not know what cancer is. In fact, I have met with dairymen who have assured me they did not know it when they saw it. It is often a running sore. At other times it only suppurates. Occasionally, perhaps, it is only a hard lump and never breaks out; this is the sort that wants looking for. If cut open it appears a light-blue, with black blood coming from it. I believe persons milking these cows are, perhaps without intention, spreading cancer more or less through the community. This being the case, I think that it comes well within the province of the Agricultural Department to draw the attention of the Government to the great necessity for the critical inspection of dairy herds. Inspection of dairy herds would unfold other abuses, such as cows suffering from tuberculosis. These are the sort of things that

want very serious attention, for under present circumstances it is no wonder dairy herds are distributors of disease. They require the closest inspection, more especially those from which milk is distributed through the communities. I said that I only intended reading a short paper; but I hope this is sufficient to create a discussion, and draw attention to the (perhaps unintentional) harm that may accrue from or through persons using the milk or products from diseased cattle. (Applause.)

Mr. E. BYTHEWAX (Gympie) complimented both Mr. Mahon and Mr. Coulson on their papers on dairying. From much of the discussion that had hitherto taken place, he thought many of them really expected too much from the Government, but he agreed with what Mr. Mahon said about the benefit of the Government brand being upon Queensland butter placed on the London market, and it would also be well perhaps to have someone appointed to see that that butter was marketed in the best possible manner. He thought it should be the study of all concerned to produce the best article possible, and to be got up in the best manner possible. As he had said that morning, an article well marketed was half sold, and if their products were landed in London in first-class condition they would command top prices. He had given much attention to dairying in his own district; and in the establishment of factories, he thought a very important point was to equip them with plenty of power so that the extension of operations would not be restricted at any time. At the Gympie factory, of which he was a director, they had a 12-horse power boiler and an engine of the same power, and they expected to be able to have a big output. A good deal had been said that day about keeping capitalists out of farmers' co-operative companies, but at Gympie they had a system, which had been suggested by the Agricultural Department, and which would, he thought, work very well. There they had two classes of co-operators among the shareholders—the producers and the capitalists—and as for these latter, he considered they were just as much producers as the other, as they produced the capital. He might add that at Gympie it would have been impossible to start the factory without the capitalist. Their total capital totalled up between £3,000 and £4,000, and the collection of this sum in a single district from the farmers alone would be a very difficult matter. In this company the capitalists get interest for their money, and the producers the dividends or bonuses that may accrue from the business of the company, and the producers had also the privilege of buying out the capitalists. Mr. Mahon had been of the greatest assistance in the getting up of this particular company, and in concluding on this subject he trusted all co-operative factories, wherever established in the colonies, would be successful.

Mr. W. R. ROBINSON (Toowoomba) would have liked to have heard condensed milk referred to. There was a lot of this product imported into Queensland, there being a good market for it in the West, and in the near future doubtless some of their factories would go in for it. The existing import duty should be ample protection. Sterilised cream was another dairy product not yet raised in this colony; in fact, he thought there were few towns in Queensland where a jug of cream could be bought, although sterilised cream from Denmark could be obtained in Sydney. In dairying, at any rate, the middleman was doing well. He probably got more out of the farmer than anyone else, and was in truth the bull calf of the industry. A good dairy bull was more than half the herd, and as long as mongrel bulls were allowed to roam about their lanes and fields they would never improve their herds. Mr. Cory had that day suggested to him, and he heartily approved of the suggestion, that the Government place a few Shire stallions, dairy bulls, and purebred boars at the Government Experiment Farms at Westbrook, Hermitage, &c. The service of these animals could be allowed to farmers at a small fee, and he had not the slightest doubt that a great improvement to the farmers' live stock in the districts in question would result. These animals would be self-supporting, as the only additional expense would be the engagement of a few stud grooms to look after the animals. The present dairy stock in most parts of Queensland could stand a tremendous lot of improvement.

Mr. O'KEEFE (Laidley) stated that the efforts of the Department of Agriculture to assist the dairying industry deserved the practical support of farmers. Mr. Mahon had referred to the proper supervision by the Government of the sources of milk supplies. This was a question of burning moment among milk suppliers throughout the colony, and whenever cases of inferior cream or butter were discussed, want of cleanliness in the source of milk supply was as often as not given as the cause. He quite agreed that such might be the case, and, as Mr Mahon had pointed out, milk from one supplier would be sufficient to spoil the whole product of a factory. But so far as suppliers in general are concerned, they were most anxious that there should be a supervision by properly appointed inspectors. They wished to have cast off from them the onus of the imputation referred to. He had recently seen a correspondence in the Brisbane Press, in which such an onus was put upon a recently established small co-operative creamery, but he could vouch for the fact that this and similar creameries were much more cleanly conducted than the general run of proprietary creameries. He was not one of those who believed in asking the Government for everything, and would not ask for anything he was not prepared to pay for. In asking for supervision, therefore, by a Government officer—with his necessary prestige—over the sources of milk supplies, he felt sure dairymen would be willing to pay for it. Milk-testing was another matter which was greatly troubling farmers at present. They felt they had every right to be equally considered in this matter as the manufacturer. It seemed a very humiliating position that the manufacturer ignored the supplier on this point. Under the present system suppliers had to depend on the integrity and capability of someone down in Brisbane, say, for the testing of their milk, &c. Often, when this matter was brought up, the answer was that the difficulty could be met by each farmer having a tester of his own. But what was the good of that? A farmer will take his cream to a co-operative creamery, and have it tested to show 50 per cent of fat. He will then send it to Brisbane, and will be told the test went 41 per cent. Under the control of a Government officer, all this would be done away with, and the Government would be put to no expense in the matter. With regard to cancer in cattle, he desired to endorse the remarks made by Mr. Bates, and in doing so, mentioned the case of a very valuable cow he had purchased, but which had afterwards to be destroyed through cancer. Everyone of her progeny developed the same disease, and had all to be shot.

Mr. A. MACFARLANE (Rockhampton) asked for further information concerning the tuberculin test. Was it suggested the Government should compel the use of the test, and would, as in England, the owner of the animal, if destroyed, be reimbursed by the Government 50 per cent. of its value? In reading up the matter in some of the British papers he saw that the test sometimes failed, and, in one notable instance, some valuable animals reacted under the test, and were accordingly destroyed. On *post-mortem* examination, however, no traces of tuberculosis could be found on them, and the expert who carried out the operations, on being questioned, then stated that in certain cases the test was unreliable, some of such cases being when an animal was suffering from excitement or was coming into season. He greatly approved of Mr. Robinson's suggestion about the Government purchasing high-class stud stock, and standing them in farming centres. Mr. Coulson in his paper had thrown out some very valuable suggestions, and, as he said, if they wanted to succeed in dairying they must keep good cows. It was also necessary that the good cows should be in the hands of good farmers, as many men did not know how to keep good stock when they had it. As had been stated, if a cow could speak, one of the first things it would probably ask for would be an improvement in the breed of farmers. Every care should be bestowed in the handling of stock, but in this colony they were frequently half-starved—left to take their chance—in winter, and when summer came round they were expected to give milk and pay their way.

Mr. T. WHITELEY (Coowonga) concurred with Mr. Coulson in his opinion of the benefits of culling in dairy herds. He knew one herd, starting with a lot of mongrels, by careful breeding and culling, reaching a very high state of perfection. The trouble, however, that had been so disastrous to the Central district, had not spared that herd, and it was now no more. He had had nine years' experience in feeding dairy cattle in the Rockhampton district, and was quite sure of the benefits of feeding them right through the year. He had been pleased to hear Mr. Robinson's remarks about stud stock, and he felt confident that if the system advocated was carried out in his district it would be largely availed of. With regard to the difficulty in cream testing, he pointed out that there had been some trouble in the sugar districts through the various associations trying to have check clerks appointed in connection with the cane weighbridges, and dairymen could agitate for a similar privilege. Cancer was spread very largely by other means than through dairy stock. On one occasion, at a boiling-down works, he saw more than thirty sheep—all very bad with cancer—killed and fed to pigs intended for human consumption.

Mr. J. E. NOAKES (Maryborough) said that in his young days cancer was very seldom known. When a person died of cancer it was generally some woman who had been badly used. The disease, however, had grown lately, and whether it was the milk or the cattle there must be some cause for it. He had known a high-class bull to be imported from New Zealand, and this animal showed cancer after a couple of years, so that it had to be destroyed. His young bulls also developed the same disease, and he (Mr. Noakes) wondered whether, by breeding such animals too finely, it tended to bring about cancer? The speaker also desired to know the best food for dairy cows, and stated that personally he had found sweet potato vines a splendid dairy fodder.

Mr. A. WALKER (North Isis) desired to know how a man could tell cancer when he saw it, and what was the most likely place on a beast to find it? The sore often seen on the place where an animal had been branded was by no means necessarily cancer, although it was called so by many people.

Mr. F. W. PEEK (Loganholme) referred to the establishment of the Health Board, and stated that in the division of Tingalpa the local board had been asked by the Health Board to pass by-laws dealing with the dairies in the district, although the district was a large one and its nearest point was at least five or six miles from Brisbane. It was pointed out to the Health Board that the regular dairies in the district were very small, and that the carrying out of such by-laws as those desired might only cause annoyance and do little good. However, the Health Board insisted on the by-laws being established, and to comply with the regulations, draft by-laws were adopted and sent to the Health Board for consideration. This body declined to approve of them, and sent back in return draft by-laws which they had themselves drawn up, and which the Tingalpa division finally had to adopt. The result now was, the divisional clerk was appointed inspector, which was an anomaly. If there was to be an inspector, he should be a properly qualified man, possessing veterinary knowledge. For instance, an inspector who would pronounce a tumour to be lumpy jaw, would be worse than useless. With regard to the special care suggested by Mr. Coulson, the speaker stated that the Logan Farming and Industrial Association had had this matter placed before them, and they had referred it to Mr. Mahon. Mr. Mahon had had referred to him a case of where cream travelling by train to a dairy had developed a taint, and on investigating the matter he discovered that the cream when shipped was placed in the same car as fish, oil, and other material. At the instance of Mr. Mahon, a deputation then waited on the General Traffic Manager, and he (Mr. Peck) was now happy to say that a refrigerating car, as well as an insulated one, was carrying cream to market in his district. He believed the railway authorities would do everything in their power to meet the wishes of farmers in this connection, and although of course they could not be expected to run refrigerating cars on every train, still, where arrangements could be made to suit a district, they would be made if desired.

Mr. MAHON, in reply to Mr. Wells, said that under the Public Health Act a local authority had power to destroy cancerous cattle. It was not compelled to give compensation for the beast destroyed, but regretted that the Act has seldom been enforced.

Mr. J. G. PALETHORPE (Toowoomba) considered the cancer question was a very serious one. He had seen plenty of cancerous cattle in travelling about, and on one occasion when seeing some so affected bullocks being slaughtered, he asked the owner what he did with them. The reply was that they were killed for the hides, and, as for the flesh—well, the people about the district came and took it.

Mr. BYTHEWAY (Gympie), in reply to Mr. Lindeman, said that, in the co-operative dairy company he had referred to, the capitalist got interest for his money, and the other shareholders got the dividends and bonuses. The producing members had the privilege of buying the capitalists out.

Mr. S. A. LINDEMAN (Bundaberg) considered in such a company the capitalists' interest should be limited, say, to 7 per cent. A fault in some companies was that farmers, perhaps in debt to the storekeepers, were afraid to come to its meetings and speak up concerning its management. The aim of everyone who had at heart the settling of people on the soil should be to make those people, if they wished to build up a true yeomanry, as free and as independent as possible.

Mr. W. DEACON (Allora) said that so far as his experience went, he had always found farmers as independent as anyone else. They were as free from human encumbrances and human liabilities as any class of men.

Mr. M. MELLOR (Gympie) said it was a matter of congratulation to farmers throughout the colony that the Government was showing such an active interest in the industry, and that they were supplying agriculturists with the services of such men as Mr. Mahon, a gentleman who had done and was doing a vast amount of good for the dairying industry of the colony. As for the matter of cancer in cattle, he considered it would be unwise to raise a panic about the matter; and, as a matter of fact, he did not think there was so much danger of the disease being communicated to human beings through cancerous cattle as some people believed, nor did he think it was increasing in Queensland any more than in any other colony. Still it would be very beneficial if the Government would take steps to destroy cancerous cattle, as any provisions for their destruction by other bodies appeared to be inoperative. In connection with this subject, it was a difficult point to learn from whence the cancer first derived its life. They knew that at times where an animal had been branded, the brand itself turned into a cancer. However, he thought if cancer was communicated to individuals, that it came more through the milk the people were supplied with than anything else; for he believed there was more cancer inside than was seen outside, and if it was communicated it was probably internally.

Mr. P. HAGENBACH (Warwick) mentioned the case of a fine dairy cow of his which had been horned by another one about ten or twelve years ago. Being a hot summer's day flies attacked the wound, and in about six months it developed into cancer, so that the animal had to be shot. None of her progeny ever showed a sign of the disease, so that he thought much of it was caused by hurts and branding.

Mr. T. A. BROMILEY (Pialba) wanted to know how to diagnose cancer. There were many tumours and sores in cows called cancer, but he was inclined to think many of the sores caused by the deep burns of brands were not cancers. Hurts such as Mr. Hagenbach had described were very rarely cancers. He did not pretend to know much about the matter, but he had examined cases and had read enough to have something of an idea of it. Cancers very nearly always appeared on the soft parts of the animal, and the running tumours about the jaws were not necessarily cancers. Still it was not an easy matter to diagnose the disease, and it would only be a properly qualified man who could always do it. Many a man would tell them that such an animal had cancer,

but how did he know, although for his own part if he (Mr. Bromiley) had a cow with a bad sore he would have it destroyed, as he would be more afraid of contact from such a cause than from cancer itself.

Mr. T. E. COULSON (Rosewood) asked if there was any cure for the disease often known as "dry pleuro." He also desired to know if the deaths of cows from the effects of young sorghum could be prevented.

Mr. JOHN MAHON said, with regard to Mr. Coulson's remarks about the necessity of the Agricultural Department sending round instructors to teach farmers to test milk, that it had been done already, from one end of the colony to the other, and he (Mr. Mahon) had been at least three times in Mr. Coulson's own district. If the Department did send round instructors the farmers would not turn up to see the milk testing. Mr. Peek had answered Mr. Coulson's grievance about the transit of cream by rail and had shown how the matter could be remedied by application to the Railway Department. He believed such a co-operative system as described by Mr. Bytheway, and in which the association consisted of producers, and non-producers, a very good one. He knew a factory at Byron Bay, in New South Wales, which was working on somewhat the same lines, and which had been very successful. Local capitalists and business men who wanted to push the district along by assisting the industry put their money into the concern, and although they might have been able to make a more remunerative investment, they were quite satisfied with their returns and with the way things had gone. As for condensed milk, a factory was being established at Cressbrook by Messrs. McConnel and Munro, both of whom he believed intended to go into the business thoroughly. He (Mr. Mahon) had a little plant on his own account, but milk condensing required a great deal of skill and plenty of cleanliness. In fact, he was convinced that no butter or cheese factory at present in the colony could carry on milk condensing under the present sources of milk supply. As for the sterilisation of cream, they had not the population to warrant the establishment of a factory for such a purpose. Sterilisation had been done in Brisbane, at the Model Dairy, and could easily be done again if there was any market for the product. With regard to Mr. Robinson's suggestion about stud stock, he believed it was the intention of the Minister to send dairy bulls to Westbrook, and the other State farms in districts where dairying was carried out, which would be available to farmers. As for a remedy for the milk-testing difficulty, about which Mr. O'Keefe had spoken, he (Mr. Mahon) suggested that the local chemist or medical man keep a Babcock tester, and the farmer bring his milk to him for testing. It was done, and gave satisfaction, at Lismore, New South Wales, and could be done here probably. The chemist would doubtless fall in with the idea readily. Mistakes might be made at times in the application of the tuberculin test, but a man who knew what he was about would never apply the test at an improper time. All that was necessary was to get the cow in a normal condition as to temperature, &c., and this was easily found. If, however, a mistake was made, and if the animal destroyed was found to be perfectly healthy, doubtless the Government or local authorities would recoup the owner for the loss of the animal. As for dairy foods, there were a large number of excellent fodders available in the colony, and among these none was better, as a milk-producer, than green maize. Mr. Coulson's "dry pleuro" or "dry cough" was known all over the coast of Australia. It was well known if cattle were taken away from the coast country on to the Downs, that they soon recovered from this complaint, which, as a matter of fact, was a mild form of tuberculosis. He had heard of cattle being poisoned through eating young sorghum, although no cases had ever come directly under his notice. The trouble in all probability arose from impaction of the stomach, and if fed at an earlier stage would not have the effect. Skimmed milk fed to cows would increase the quantity of the milk but not the quality. He had had an instance of this at the late Gympie show, where in the milking competition the winner had given his cows milk to drink. The success of dairying depended upon the way a man

attended to his herd. For a butter factory to pay it would have to turn out at least half-a-ton of butter per day. About 1d. to 1½d. per lb. would cover the cost of the manufacture of the butter, not including the cost of separating.

Mr. W. A. A. BATES (Boompa) replied to the remarks that had been made about his paper, and in doing so disagreed with Mr. Bromiley in his statement that cancer appeared chiefly in the soft parts of an animal. He held it came out most frequently on the brand or in the eye. As for what Mr. Mellor had said, he was not aware as to the relative amount of cancer in Queensland and the Southern colonies, but he could assure Mr. Mellor there was quite enough in Queensland. Mr. Walker had asked how cancer could be distinguished, but he (Mr. Bates) did not think there were many in the room who could teach Mr. Walker much about the matter.

Mr. CHATAWAY, in closing the discussion, said that he was especially glad to find that on nearly all hands farmers approved of a proper supervision of dairies, and when the measure to enable this to be carried out was again brought before the House, as it was brought before the Council last year, he trusted that it would receive their support. It had been found useless to leave the inspection of such places to boards or councils. Dairymen had votes, and the aldermen knew it; dairymen had friends, and again the aldermen were acquainted with the fact. The lives and health of the people, however, should count for something, and he thought it was the duty of the Central Government to take the power out of the hands of those who refused or were afraid to use it. Cognate with the inspection of dairies was the subject of the branding of butter for export. The Agricultural Department was anxious to obtain power to grade and brand butter, in order that an article which was distinctly inferior might not be exported branded as "Best Queensland factory butter." They had no desire to prohibit its export, but desired to have it sold on its merits. It had been suggested that the Department provide for farmers stud bulls, horses, and boars, which were to be self-supporting through the small fee which was to be charged for their services. He noticed that the gentlemen who had advocated the system emphasised the word "small," which made him wonder whether the fees would pay for the cost of standing the animals. However, if an association of dairymen, say, desired the use of a bull for a year or term, and guaranteed a reasonable rent for him, it was quite possible the Department would be willing to consider the offer, but the proposal that the Department should place a number of valuable stud animals about the country on the chance of farmers sending females to them for a small fee, did not seem to him to have many recommendations, except perhaps to those who received the use of the animals at the small fee. There was another matter which apparently exercised the minds of milk suppliers, and that was the matter of the testing of cream. Mr. Mahon had suggested one way out of the trouble, but he thought there should be no difficulty provided the suppliers associated. In the district represented at the Conference by Messrs. Swayne and Denman there were something like 200,000 tons of cane sold annually over the weighbridges to the various mills. There was a strong association of growers, and at each weighbridge there was a check weighman. He was paid by the associated farmers from a levy of from ½d. to ¼d. per ton on all cane supplied, and he acted as a check against the weighbridge clerk belonging to the mill, the system giving satisfaction to all concerned. Again, in California about 80,000 tons of beet are sold every year to the Chino sugar factory by the growers, who have an intricate check system. The beet is sold by analysis and not by weight, so that they could understand a sale entailed just as much work as the use of a Babcock tester. The farmers, however, had a chemist of their own in the factory laboratory, who checked the work of the chemist employed by the factory and saw that the growers were properly dealt with. If it was possible for beet suppliers to keep a check on such a delicate work as analysis, surely it ought to be possible for small creameries to associate together and get a check tester among themselves. In any event, it was done in other parts of the world.

(To be continued.)

Agriculture.

LIQUID MANURE.

By R. R. HARDING,
Curator, Botanic Garden, Toowoomba.

THE earth in its uncultivated state is sufficient for vegetation, yet when by cultivation the land is as it were forced to produce a greater increase for the use of man, we cannot raise those rich and numerous crops, so necessary to the existence of the population of a civilised country, without affording the vegetable creation an artificial supply of nourishment. It is no less true in the vegetable than in the animal kingdom, that food must be proportioned to the population in order to maintain it. The mode which art has devised to increase the quantity of food for plants is to manure the soil, in some form or other, so that the primitive elements can enter into the vegetable kingdom. Dung or solid manures in many cases can only be supplied to the soil before the crop is planted or sown, as it could not afterwards be dug in without disturbing the roots.

The Chinese, who are remarkably skilful in the management of manures, are particularly careful not to waste the smallest portions. Especially do they apply nightsoil in a liquid state to all kinds of plants. This manure, with all sorts of waste foliage, is put into a tank which is sunk in the ground, and here, in addition to the materials mentioned, they mix as much animal water (urine) as can be collected, or common water, to dilute the whole; and when it is in a state of putrefaction they apply it to the soil, steeping all their seeds, and dipping the roots of all young plants before planting into this liquid manure. Loathsome as this may appear, yet when we consider it as the means which Nature employs to renovate existence, and continue the circle of creation, we must think of it with admiration rather than disgust. The operations of Nature are always admirable; these elementary substances, which in their simple state would be disagreeable to us, by passing into the vegetable system, are converted into the most palatable and nutritious. It is a common thing in England for gardeners to arrange with dairymen for a constant supply of animal water from their cowsheds. This is used for all kinds of plants at the rate of one pint mixed with two gallons of clean water, and they consider this is one of the most effective of liquid manures. It is incalculable how many valuable materials are wasted in this colony, which would have given vigour to vegetation. This animal water forms an exceedingly powerful manure, containing various principles which, during putrefaction, yield large quantities of ammonia, which likewise contains many valuable ingredients of the food of plants. The composition of this water varies in different kinds of animals and in individuals of the same species, and a good plan, where this water is lying near the sheds, is to dump some sawdust or charcoal into it, which absorbs it, and is easily removed. The green slime of ponds and all stagnant waters make very rich manure; they are considered storehouses of materials ready to return into the vegetable kingdom.

That water charged with manurial elements has a powerful influence upon vegetable life, is so well known to those who cultivate plants of almost every description as to require no affirmation, yet there is often a wide difference of opinion amongst those who are so engaged as to the value of the different liquid fertilisers or stimulants generally used, some maintaining that it is better to apply manure in a solid state, and that the majority of liquids so used are

often stimulative in their influences, producing little, if any, permanent good. I well recollect the time when this estimate of manure water even amongst us gardeners was much more prevalent than it now is. The many various solid manures now in use are simply so much food, varying in their influences upon the plants to which they are applied according to the different elements of which they, the manures, are composed, almost as much as do the various articles of diet consumed and assimilated by animals. A given kind of manure may be the best possible for some particular species of plant, affording all the elements requisite to build up and sustain it, and still be of little value to another plant that requires something essentially different for its support. Through the joint result of chemical researches and advanced knowledge in cultivation this is now better understood than it used to be, but the fact is not always realised that the effect of manure in a liquid state must necessarily be in accord with that of the solid matter which is used to make it.

For instance, soot is one of the most exciting stimulants known, quickly becoming exhausted, after which, unless something else is at hand to sustain the exuberant growth thus excited, the plant languishes to a greater extent than it would have done if the extra growth made through the effects of the soot had been non-existent. (Guano has a tendency in the same direction, but does not so soon become exhausted.) Soot is generally applied as a top dressing; but it is best to apply it as a liquid manure. I take all that can be obtained, and simply enclose half-a-bushel in a bag and sink it to the bottom of one of the tanks which is sunk in the ground; this holds about 600 gallons of water, and all plants are watered, large and small, with this. Visitors often remark how healthy and green the plants look. The various animal excremental manures are possessed of fertilising as well as of lasting properties in a great measure proportionate to the description of food on which the animals have been fed. For example, the manure from cattle fed on hay and corn is much richer than if their food consisted of grass. Purely animal manures vary considerably in strength, and their enduring properties, in a great measure, are ruled by their rate of decomposition.

At the time a plant is put out in the open ground, or placed in a pot or other confined space, solid manure in quantity limited by its nature and strength, as also by the ability of the plant to absorb and assimilate food, more or less freely, can be given; but beyond this we cannot go, as, if too much manure is present in the soil, its effects are identical with those which result from an animal taking food stronger than the digestive organs are able of digesting and assimilating. It then follows that after a time the manure first present within the reach of the roots gets exhausted; it then becomes a question of providing more in either a solid or liquid state—the former usually in the shape of a top dressing, the latter by soaking the soil to which the roots are restricted. The use of solid manure, except in a highly concentrated state, is generally convenient for such plants as most frequently need assistance; that is, when they have their roots confined to pots, with no access to food beyond the limited space in which they thus exist. It is then that manure water becomes the most convenient, and often the most beneficial in its effects, for in this way food is brought immediately within the reach of the whole number of hungry mouths (the feeding fibres) quicker than by the use of solid matter laid on the surface, which takes time to get washed down in the ordinary process of watering.

There can be no question that the time of active growth in both roots and branches is the proper time for using the manure water, and when plants exist that want assistance in this way, especially such as are naturally of a hardwooded enduring character, I should advise that in all cases some be given as soon as growth commences in either the roots or the shoots; otherwise the first effort of the shoots will be weak, and no subsequent application of manure during the ensuing summer will in that case strengthen them so as to make the collective growth equal to what it would have been if the food they required had been within the reach at the time they began to

grow. A matter which it is important to keep in view is, that at the time any plant is just in the height of its growth it will then bear manure water being given more freely than either at the beginning or later in the season. Another thing of quite as much importance, and which those who are first commencing to grow any kind of plants will find it to their advantage to note, is that plants have not the power to reject the food that is brought in contact with their roots in the way that manure water is; whether the water they thus imbibe is sufficiently or over-charged with food, they must take it. If it is too strong, the effects are seen sooner or later, but often when much mischief is done. It is always well to keep on the safe side; frequent applications are very much preferable to stronger doses, even if they are slightly too strong. As a rule, the slower growth a plant naturally makes, the less able is it to bear manure water in a strong state. This fact, not having been fully seen and acted upon, results in many plants that are generally supposed to be unable to bear manure water at all, such as the slow-growing hardwood conservatory plants; yet it is in the case of these subjects, more even than stronger-rooted things, which can bear partial shaking out and renewal of soil, that assistance by the use of liquid manure is often most required. It is scarcely necessary to mention that whenever manure water is used, even to the most vigorous growing plant, which, consequent upon its strength, is able to bear that which would be death to others weaker, the liquid should always be clear and transparent, otherwise the sediment it contains is certain to clog up the soil, and make it too impervious to water afterwards. All who have given the least attention to such matters here stated are fully cognisant of the fact that liquid manure, prepared in the usual way by the admixture of water with some solid manurial matter, must of necessity possess elements identical with those of the solid matter to which it owes its fertility, the potency of the liquid being proportionate to the volubility of the solid matter—of course, governed by the extent of dilution.

THE FOOD OF HORSES.

FROM a paper read by Mr. T. Jeffs at the Agricultural Bureau Conference, at Kapunda (S.A.), we extract the following pertinent remarks about feeding farm horses:—

The farmer should well consider the constitution of his horses. This varies very much; one will have a good appetite and eat up all his dinner, and be ready for his afternoon's work in reasonable time, while the horse with a poor appetite will take more time and pick out the best parts. This is no fault of the horse, but may be remedied by giving him some appetising medicine. I prefer giving such a horse less in quantity but better in quality—say, a little more bran and pollard. This will enable the weaker horse to keep up to his work. Old horses must have more attention than younger ones in the matter of food. It is unreasonable to expect old horses to do the same amount of work as younger ones on the same kind of food. In a team of five or six horses, there will be one or more slower at their work than others. The driver should carefully consider where the fault lies—if there is a fault—and not punish what appears to be a slow horse. In no case should the reins be used as a whip. If the middle horse requires waking up, and it is done with the rein, the outside horse is irritated by having his mouth jerked in such a way as to give him unnecessary pain. It would be much better to carry a light whip and use that when required. A sharp clip with the whip would be more effectual than so much banging with the reins.

Dairying.

DAIRYING COMPETITION.

THE following results of the milking competitions, lately held at Rockhampton, have been supplied to us by Mr. Mahon, Dairy Instructor:—

MILKING COMPETITION.

ROCKHAMPTON AGRICULTURAL SOCIETY.

Prize offered by the Department of Agriculture, Brisbane.

For Best Cow in Milk.—To be judged for quantity and quality; the *bonâ fide* property of the exhibitor. The cow yielding the greatest percentage of butter fat in two consecutive days to be awarded the prize. The cow to be on the show ground at 5 o'clock on the evening previous to the first day of the show, and shall be milked dry in the presence of a judge or steward. Milking competition to commence at 6 a.m. on the morning of the first day of the show, and be carried out for two consecutive days, commencing at 6 a.m. and 6 p.m. each day. Testing to be done by the Babcock milk-tester.

Date.	Owner.	Name of Cow.	Milking.	Pounds Milk.	Percentage Butter Fat.	Commercial Butter.	Average for Day.
1898.						Lb.	Lb.
10 May	Archer Bros. ...	Cherry... ..	Morning	12½	3·3	0·476	0·965
		Buttercup ...	"	13	4·4	0·684	1·423
		Lady Lindsey	"	10½	3·8	0·399	0·750
	A. McFarlane	Lovely ...	"	17½	3·2	0·672	1·314
		Queenie ...	"	7	3·5	0·273	0·624
	Archer Bros. ...	Cherry... ..	Evening	11½	3·8	0·489	
		Buttercup ...	"	11	6·0	0·739	
		Lady Lindsey	"	9½	3·4	0·351	
	A. McFarlane	Lovely ...	"	14	4·1	0·612	
		Queenie ...	"	5½	3·0	0·351	
11 May	Archer Bros. ...	Cherry... ..	Morning	12¼	3·6	0·493	1·293
		Buttercup ...	"	12¼	4·6	0·656	1·311
		Lady Lindsey	"	10	3·8	0·425	0·962
	A. McFarlane	Lovely ...	"	19	3·6	0·766	1·548
		Queenie ...	"	7	4·6	0·360	0·560
	Archer Bros. ...	Cherry... ..	Evening	13¼	5·4	0·800	
		Buttercup ...	"	13	4·5	0·655	
		Lady Lindsey	"	10	4·8	0·537	
	A. McFarlane	Lovely ...	"	16¼	4·3	0·782	
		Queenie ...	"	6	3·0	0·200	

ROCKHAMPTON AGRICULTURAL SOCIETY.

Class 112.—Milch cow, to be milked dry by some person appointed by the stewards—no exhibitor is to milk his cow on this day—at 5 p.m. on the day previous to the show, and to be milked in the morning and evening of the show day, in the presence of one or more of the stewards. Butter return for the twenty-four hours' milk as shown by the Babcock milk-tester to be the test. First prize, £3 3s. ; second prize, £1 1s.

Date.	Owner.	Name of Cow.	Milking.	Pounds Milk.	Percentage Butter Fat.	Commercial Butter	Average for Day.
1898.						Lb.	Lb.
10 May	Archer Bros. ...	Cherry... ..	Morning	12½	3·3	0·476	0·965
		Buttercup ...	"	13	4·7	0·684	1·423
		Lady Lindsey	"	10½	3·8	0·399	0·698
	A. Macfarlane	Lovely... ..	"	17½	3·2	0·627	1·269
	Archer Bros. ...	Cherry... ..	Evening	11½	3·8	0·489	
		Buttercup ...	"	11	6·0	0·739	
		Lady Lindsey	"	9½	3·4	0·359	
	A. Macfarlane	Lovely... ..	"	14	4·1	0·642	

ROCKHAMPTON AGRICULTURAL SOCIETY.

Class 113.—Milch cow, giving the greatest weight in two milkings. Same conditions for milking as Class 112. Prize not awarded if less than 20 lb. First prize, £3 3s.; second prize, £1 1s.

Date.	Owner.	Name of Cow.	Milking.	Pounds Milk.	Percentage Butter Fat.	Commercial Butter.
1898.					Lb.	Lb.
10 May ...	Archer Bros. ...	Cherry ...	Morning ...	12½	3·3	0·476
		Buttercup ...	" ...	13	4·7	0·684
		Lady Lindsey ...	" ...	10½	3·8	0·399
	A. Macfarlane ...	Lovely ...	" ...	17½	3·2	0·627
	Archer Bros. ...	Cherry ...	Evening ...	11½	3·8	0·489
		Buttercup ...	" ...	11	6·0	0·739
		Lady Lindsey ...	" ...	9¼	3·4	0·359
	A. Macfarlane ...	Lovely ...	" ...	14	4·1	0·642

CENTRAL DISTRICT.

Competition for Ayrshire Bull offered by the Department of Agriculture.

ROCKHAMPTON AGRICULTURAL SOCIETY.

10TH AND 11TH MAY, 1898.

Conditions.

- 1. Competitors must be personally carrying on dairying as part of their farming business upon holdings of not less than 60 acres of land, and must own not less than six dairy cows.
- 2. Each competitor to enter not less than three dairy cows, which are to be tested on the ground for three consecutive days under the supervision of an officer of the Department, who will keep a record of the quantity and quality of the milk of each animal entered.
- 3. Any cow not yielding 1¼ lb. of butter daily will be disqualified.
- 4. Any cow entered and producing more than 1¼ lb. of butter daily shall be entitled to be registered as a dairy cow, and have the Department's brand placed upon her horns as evidence of her right to be registered.
- 5. The competition to be open only to residents of the Central district.

There being other societies in the Central district who will be holding similar competitions during the present year, the award will not, of course, be finally settled upon until all the competitions have taken place. The name and particulars of the bull offered will be forwarded you later.

Cows competing : Property of Archer Bros., Gracemere.

Date.	Name of Cow.	Milking.	Pounds Milk.	Percentage Butter Fat.	Commercial Butter.	Average for Day.
1898.					Lb.	Lb.
10 May ...	Cherry ...	Morning ...	12½	3·4	0·476	Buttercup 0·965
	Buttercup ...	" ...	13	4·7	0·684	
	Lady Lindsey ...	" ...	10½	3·8	0·399	Cherry 1·423
	Cherry ...	Evening ...	11½	3·8	0·489	
	Buttercup ...	" ...	11	6·0	0·739	Buttercup 0·750
	Lady Lindsey ...	" ...	9¼	3·4	0·351	
11 May ...	Cherry ...	Morning ...	12¼	3·6	0·493	Cherry 1·293
	Buttercup ...	" ...	12¼	4·6	0·656	
	Lady Lindsey ...	" ...	10	3·8	0·425	Buttercup 1·311
	Cherry ...	Evening ...	13¼	5·4	0·800	
	Buttercup ...	" ...	13	4·5	0·655	Lady Lindsey 0·962
	Lady Lindsey ...	" ...	10	4·8	0·537	

QUEENSLAND PASTORAL AND AGRICULTURAL SOCIETY, IPSWICH.

87. *Best Cow in Milk*.—To be judged for quantity and quality, the *bonâ fide* property of the exhibitor; the cow yielding the greatest percentage of butter fat in two consecutive days to be awarded the prize. The cow to be on the show ground at 5 o'clock in the evening previous to the first day of the show, and shall be milked dry in the presence of a judge or steward. Milking competition to commence at 6 a.m. on the morning of the first day of the show, and be carried out for two consecutive days, commencing at 6 a.m. and 6 p.m. each day. Testing to be done by Babcock milk-tester. Prize, £1 1s., offered by Department of Agriculture.

First Prize—

Mrs. Solomon, Sandy Gallop, Milch cow—						
1st June	...	...	27½ lb. milk	...	...	1.130 commercial butter
2nd June	...	...	28 „	...	...	1.155 „ „
Total						2.285 „ „

Second Prize—

Mr. Bowman's Daisy—						
1st June	...	...	25½ lb. milk	...	...	1.117 commercial butter
2nd June	...	...	23 „	...	...	0.983 „ „
Total...						2.100 „ „

QUEENSLAND PASTORAL AND AGRICULTURAL SOCIETY, IPSWICH.

83A.—Best dairy cow, by test, bred and owned by a *bonâ fide* farmer; £3 3s., presented by Mr. F. T. L. Cardew.

Date.	Owner.	Name of Cow.	Milking.	Pounds Milk.	Percentage Butter Fat.	Commercial Butter.
1898.					Lb.	Lb.
1 June ...	W. J. Waters ...	Lady Rupert	Morning ...	15	5.0	0.840
		Minnie ...	„ ...	9½	4.6	0.489
		Daisy ...	„ ...	14½	4.0	0.649
	J. L. Bowman ...	Lady Rupert	Evening ...	12	3.8	0.510
		Minnie ...	„ ...	9½	4.2	0.446
		Daisy ...	„ ...	11	3.8	0.468
2 June ...	W. J. Waters ...	Lady Rupert	Morning ...	16½	3.0	0.554
		Minnie ...	„ ...	11	4.5	0.554
		Daisy ...	„ ...	12½	4.0	0.560
	J. L. Bowman ...	Lady Rupert	Evening ...	13	4.6	0.660
		Minnie ...	„ ...	9	4.2	0.423
		Daisy ...	„ ...	10½	3.6	0.423

First—

Lady Rupert—						
1st June	...	...	27 lb. milk	...	...	1.350 commercial butter
2nd June	...	...	29½ „	...	...	1.214 „ „
Total for two days						56½ „ „

Second—

Daisy—						
1st June	...	...	25½ lb. milk	...	...	1.117 commercial butter
2nd June	...	...	21½ „	...	...	0.983 „ „
Total for two days						47 „ „

Horse-breeding.

CROSS-BREEDING.

By "ARAB."

THE superiority of the English thoroughbred over the horses of every country, not even excepting Arabia, cannot be questioned. He is true Arab, and generous treatment has made him as superior to the parent-stock of Arabia as we may suppose Solomon's stock to have been to the parent Egyptian stock.

Arabia never formed nor improved the type of horse for which it has become famous; but its conservative, unprogressive customs, which are to-day just what they were in the days of Abraham, has served as a conservatory for the type which the Egyptians evolved and Solomon perfected and fixed. When Israel and Egypt were conquered and laid desolate by the conquering armies of other powers—which, judging from more recent history of nations, is adverse and ruinous to improvement in horse-breeding, the conquerors invariably seizing the best stamps, as was the case in Ireland, also in modern Egypt—this type of horse found in Arabia a home and shelter where it was conserved in absolute purity, though it may have run down in size from what it had been in the war chariots of Egypt and Solomon under a more generous system of feeding. Under generous treatment and better fare, the Arab rapidly increases in size—instance the English thoroughbred. There is every reason to believe that had the English thoroughbred been selected and specialised for size and power during the same period that he has been selected and specialised for speed, the English people would have had a horse as superior to the Clydesdale for draught as the Clydesdale is to the draughts of the ancient type of straight formation.

Englishmen are very far from having clear or correct ideas on the horse. I have no doubt this will not be credited by many Englishmen; still it is a fact well known to Scotch judges of the horse.

It has kept the horses of England unimproved, and has had a most harmful effect on our Australian stock of horses.

In Australia we find that, wherever English ideas on the horse have prevailed, the horses other than thoroughbreds are of a very low order. In New South Wales and Queensland, English horse notions have prevailed, and in those colonies we find a very poor style of draught and useful horses. In Victoria and New Zealand, Scotch ideas led, and we have quite a superior class of horse.

To "Scotch Jock," a real enthusiast and splendid judge, may be ascribed the credit of the superiority of the Victorian and New Zealand horses. His enthusiasm acted on others; and in Victoria, in the boom times of the early fifties, "Scotch Jock" was kept at work importing from Tasmania and New South Wales their best stamps, and the best of Clydesdales from Scotland he also imported. This resulted in a very superior class of horse being raised in Victoria. In 1869 a Victorian mare took the first prize at Warwick show; she would have been a credit to the Highland Agricultural Society's show grounds. It was then I received my first impression of the harmful effects of crossing the straight formation on the oblique. The foal at her foot, though a great well-grown youngster, was a wretched mongrel. He was sired by a Shire horse.

When the New Zealand boom times came on in the early sixties, "Scotch Jock" was again to the front. He stocked the New Zealand farmers with the best of the Victorian stock, which had been raised from those he had selected for Victoria ten years before.

After "Scotch Jock" joined the majority, a class of dealers stepped into his place who had a greater regard and better judgment for £ s. d. than for a good horse. They flooded Victoria with imported horses of a low grade, many of them Shires and low-grade Clydesdales, which have had a very bad effect on the Victorian stock.

Since the day of De Bohun (the representative of Norman Conquest), when he is first introduced to us on the morning of Bannockburn, charging down on Robert Bruce in full confidence that his great Norman warhorse (*alias* Percheron, *alias* Suffolk Punch), of straight formation, would ride down Robert Bruce and his Arab pony of oblique formation, the Englishman's confidence in mere bulk in a horse remains much the same until this day, as the pages of "Youatt" disclose. It took Robert Bruce's rather rough surgical operation to get it out of De Bohun's head. Will nothing less get it out of Englishmen's heads to-day, so that our horse stock in Australia may be improved?

In a way it is amusing to stand by and observe the purblindness of Englishmen in regard to this matter of formation in their horses.

Let us take, for example, the English horse-drivers. They admire the style and carriage of the horses of oblique formation, and they, supposing it to be a matter of training, set about training their horses to show the same style. This is really the object of the cruel bearing-reins so common at one time in England. It is positive cruelty—as their poor mokes of straight formation have their necks set in the shoulder at much the same set as an old ewe—to exact from them a carriage of head and neck similar to that of a horse which has his neck set down on an oblique shoulder, and is really distressing to the horse of straight formation, and becomes painful when long sustained in this position by bearing-reins.

Some years ago a squatter neighbour commissioned a New South Wales judge to select a lot of good mares and a horse. The mares were bought at auction as New Zealand ships arrived in Sydney. They were a good lot—Clydesdale sorts. The horse was a Shire of very straight formation, with neither style, carriage, nor action. I was much amused, when looking at them, to find the owner was so purblind as to think the want of style, carriage, and action arose through want of training, and that training would overcome the evident defects in his stud horse. The training had begun—they were feeding the poor brute out of a box set over 5 feet from the ground; this was to impart a lofty carriage of head and neck.

I cite these instances only to show the confusion of ideas that obtains amongst English owners and breeders. They appreciate the style that the oblique formation gives, but do not perceive that it is given solely by the formation, and that it is purely a matter of breeding, not of training.

In the sixties, when Scotch Clydesdale breeders were making such a mad rush in increasing the size of the Clydesdale by going to English fairs to pick up a good stamp of mares conforming to Clydesdale type, they used to say that the Englishmen had good horses, but did not know them; they found they could get the good ones at less money than those which they would not have had at any price. English agricultural writers of late have affirmed that the best way to improve the Shire horse would be to have nothing but Scotch judges in their show rings. The Shire horse has certainly the elements of improvement within himself. In this respect he is not like some other draught breeds—he is not a native, unimproved breed; his colours and many other Arab characteristics put him on quite a different plane from the Belgian, Percheron, or Suffolk Punch. His legs are Arab typed, and have not the same defects as those other breeds. That in some long past time he has been benefited by the Scotch Arab strain is certain, when we reflect that all the North of England was held on feudal tenure by the Scottish kings before the

war of independence. That he has since been neglected and deteriorated, and the Arab character lost in a great measure through the ignorant mistaken ideas of his owners and breeders, is very evident. With the spread of a better knowledge amongst the owners and breeders of the Shire, it is a class of horse that would readily improve and become a high-class animal of oblique Arab type—not so the Belgian, Percheron, or Suffolk Punch, their legs being of quite a different formation. They are “tied in” on canons owing to faulty form of bones forming the knee-joint. To overlay with Arab formation to alter this, the horse that would remain would be pure Arab.

It is generally accepted that when overlaying—grading, the Americans would say—with any desired type the alteration desired begins at the head, and the overlaying works backwards towards the extremities as the overlaying or grading is continued.

In the human family it is known that those having negro blood may, by having only white forbears for several generations, have become fair and freckled, with light hair and blue eyes, and yet retain the negro heels and knuckles. To get rid of the bad formation of knees, canons, and pasterns of those ancient native breeds, such as Belgian, Percheron, and Suffolk, we may realise how little of them would remain, from this negro instance. Practically, the whole superstructure has to be removed to reach the foundations.

Bruce's exploit with De Bohun has been dwelt upon by historians as a daring, foolhardy feat, and displaying great and exceptional courage on the part of Bruce. Anyone with an experience of Australian stock-riding will realise the absolute safety of Bruce—mounted on an Arab—from De Bohun on a horse of the ancient native breed of straight formation with several hundredweight up—man and mail sometimes equalled 10 cwt. To extol this feat as daring or foolhardy in a camp of Australian stockmen could only be as a huge joke—wrote sarcastic; but there is one aspect of this exploit which historians have failed to grasp: It was the death-knell of Norman Conquest. Their men-at-arms, who had ridden down Harold and his Saxon followers at Hastings, and had just before ridden down the Welsh and Irish, were in this feat of Bruce's shown to be powerless, ineffective, and harmless to men of nerve mounted on the Arab galloways which then constituted the horse stock of Scotland. Bruce, who was a great general, quickly availed himself of this Bannockburn experience, so that when Edward III., eager to avenge Bannockburn, approached the Scottish border with an army of 100,000 men, such as England had never marshalled before—for the first time Wales and Ireland both supplied picked troops—Bruce despatched 20,000 mounted spearmen, all confident as to their ability to hold the Norman men-at-arms as cheaply as Bruce had at Bannockburn. The feats of this band in face of such an army under such a general as Edward III. only required a Xenophon to make it read more wonderful than the retreat of the 10,000.

The power of the Norman kings and their select following of men-at-arms to oppress the people of England was broken for ever, and all this was brought about by such a simple thing as a slight variation of the angle of the bones of the horses' shoulders, hips, and pasterns—such a small matter that historians have hitherto failed to see it even with their spectacles on.

Viticulture.

MALADIES OF WINE.

THEIR CAUSE AND TREATMENT.

By E. H. RAINFORD.

IN describing the diseases to which wine is subject, it is necessary to use, in some cases, French significations to distinguish them, as the English terms—acid, sour, turned, scuddy, &c.—indicate a *condition* of the wine, and not the malady with which it is affected. Several wines may be sour and turned, and each be affected with a different disease and requiring a different treatment. The principal defects which affect wine are Casse, Acescence, Tourne, Pousse, Graisse, Amer; all but the first are due to the action of a special organism or ferment.

THE “CASSE.”

The malady known as “casse” is caused by an imperfect balance of the constituents of the must, due to either abnormal vegetation during the ripening of the grape or to the effects of cryptogamic diseases of the vine. In the latter case, cells of the fruit and leaf have been destroyed by the growth of the fungus, and, as a consequence, the functions of the plant interfered with in the formation of the fruit constituents, a similar effect being produced by abnormal vegetation during the ripening period, caused by either cold or continued wet weather, &c.

The signs by which “casse” may be known are the browning or blackening of both red and white wine on exposure to the air, followed by turbidity and deposition of a sediment containing more or less of the colouring matter. In the cask or bottle the wine will appear to be perfectly sound, bright, and of good colour, but if some is poured into a tumbler, or a bottle of the wine is left uncorked, after some minutes or hours, according as the wine is more or less affected, a discolouration begins at the surface, having the appearance of an iridescent film which gradually passes down to the bottom of the wine and is deposited in the form of a sediment, leaving the wine clear again, but with the colour materially affected, red wine becoming brown or even yellow, and white wine yellow or leaden. At the same time the wine becomes flat, and occasionally acquires a disagreeable taste.

Formerly the causes of the above phenomena were not understood, but later researches have tended to prove that the discolouration is due to the action of an oxidising diastase called oxydase, existing in abnormal quantity in the wine. This substance, produced in the grape, has the power of fixing the oxygen derived from the atmosphere upon the most oxidisable of the glucosides, which in this case is the colouring matter. From the causes before mentioned the colouring matter is in an unstable condition, and there is an abnormal development in the grape of oxydase which acts, so to say, as carrier of the oxygen to the colouring matter, which becomes either insoluble, and is deposited as a sediment, or the oxidation causes a darkening in the case of white wines. Some writers are of opinion that ferrous salts in solution in the wine play a rôle in precipitating the colour, but do not explain why “casse” is more prevalent after unfavourable seasons or in wine made from diseased grapes.

Vignerons should be prepared for the development in their wines of this disease in those seasons when drought, continued wet weather before the vintage, rotting of grapes, or fungus disease have been the cause of instability of the colouring matter and an abnormal secretion of oxydase. The instability of the colouring matter can be considerably ameliorated by careful attention to the acidity of the must, correcting it by addition of tartaric acid where wanting, which will assist in fixing the colour.

There are two ways of curing this disease: One is by pasteurisation, or heating the wine to 150 degrees, which kills the oxydase; but, as the apparatus to effect this is not to be found in Queensland, the second method must be adopted, and that is by exposing the oxydase to the influence of sulphurous acid, which also affects its action.

The easiest way of doing so is to rack the wine into a clean cask in which has been burnt 1 to 2 oz. of sulphur in the form of a match to each 100 gallons of wine, according to the severity of the case. It is essential that the remedy is not abused, or there will be a risk of bleaching the wine very seriously. A far better way of administering the sulphurous acid is in the shape of bi-sulphite of potash, from $\frac{1}{2}$ to 1 oz. for every 100 gallons, which should be dissolved in some wine and mixed with the rest during the racking; give a light fining afterwards. By drawing off a little wine and exposing it for some hours to the air, it will be seen if enough sulphurous acid has been given; if it continues to darken and cloud, more must be used.

ACESCENCE.

Acesence, or acetification, is a disease caused by a special germ which converts the alcohol of wine into acetic acid; it generally follows the appearance of flowers, as the whitish scum is called, on the surface of wine due to a minute fungus called *Mycoderma vini*, so that vignerons should be careful to prevent the appearance of flowers by keeping the cask well filled, or if by accident they form on the surface of the wine get rid of them by filling up the cask sufficiently to reject them out of the bung-hole. The flowers are not of so much danger to the wine in themselves, as being the forerunners of the germs of acetification, indicating by their presence a condition of affairs favourable for the development of the *Mycoderma aceti*. An insufficiently filled cask is therefore one reason for acetification.

Guyot, a French wine expert of earlier times, gives as another reason for acetification the law of assimilation as expounded by Ampère. He (Ampère) says:—"When a certain quantity of water contains in solution the elements of several crystallisable salts, if you introduce into this water a crystal composed of one of those salts of which the water contains the elements, there will be formed in the vessel a quantity of analogous crystals of the same composition as that which has been introduced into the mother liquid, and no other crystal will be deposited," giving, as examples of this law, the smallpox and other diseases besides many others drawn from the animal, vegetable, and mineral kingdoms. Guyot contends that under this law if at any given point of a cask the wine begins to acetify, such as at the bung-hole, taphole, or a leakage through a stave, the law of assimilation will assert itself, and little by little the whole body of liquid will acetify; the exterior point of acetification acting on the mass of the wine as the single crystal of salt did to Ampère's compound solution.

Modern researches have proved that the transformation of alcohol into acetic acid is the work of a yeast or ferment, so that Guyot's theory of acetification is inadmissible; but at the same time vignerons would do well to suppress similar sources of infection, as, whether germs or the law of assimilation are the cause, the fact of the bulk of the wine being in contact with one or more points where acetification has started cannot but be injurious to it.

Another reason for the presence of germs of acidity in wines is the system of bunging adopted by many vignerons in Queensland—a worse could hardly

be invented. A cone of wood wrapped in rag or sacking is driven into the bung-hole with a mallet. To begin with, unless the bung-hole and cone are both perfectly cylindrical, which is rarely the case, they do not fit; true, the sacking is employed to fill up the inequalities, but if there is any elongation of the bung-hole it is ineffective. To prove the fact, let the vigneron turn his casks on their sides and see how many leak at the bung, and where wine comes out air goes in. Besides the aërication of the wine, the cone and sacking is immersed in the liquid if the cask is full, as it should be, and by capillary attraction the wine is drawn to the exterior. This can be proved by the touch; in most cases the sacking will be found to be wet or damp. The sacking, moistened by wine and exposed to the air, forms the most perfect arrangement for acetification that could be contrived, as can be proved by the smell, so that the wine in the cask is constantly in close connection with a vinegary rag. The whole arrangement is defective and dangerous. The bung should be of sound cork, 1 inch to $1\frac{1}{2}$ inches thick, folded in on two layers of sacking, and driven in with a moderately hard blow. The elasticity of the cork will fill up all inequalities of the bung-hole, preventing access of air, and as it will barely reach the interior surface of the stave, the wine cannot wet the sacking even if the casks are quite full. If the cork is compact, no germs will pass through, but it is better to dip the outer surface in hot pitch or the inner in melted paraffin wax. If this class of bung is used, there will be little danger of acetification starting at that point.

Another source of danger from this malady is the system of sampling from the bung with dippers; it is utterly wrong. The wine is disturbed each time with the insertion of the dipper and the banging with the mallet. The dipper is rarely washed, and probably carries into the wine each time it is used a drop or two of acetified wine containing a few colonies of *Mycoderma aceti*—this happening, it may be, several times a month. The bungs should never be removed from casks of light wines except with the object of refilling or “ouillage.” Any sample required should be drawn by means of a small tap or spigot in the head; if these are objected to, samples can be drawn through a gimlet-hole and stopped with wax. The wine is drawn by inserting a bradawl or similar tool through the wax, and when enough has run the hole is stopped with a small piece of fresh wax forced in with the handle; a little kneading with the thumb and finger will soften it enough for the purpose. There is no danger of leakage if ordinary care is taken, and the hole not made too large.

Acetification of a wine can also be started by racking it into a cask that has been improperly preserved, and in which the *Mycoderma* have entered and multiplied. No cask should be used for that purpose which gives the slightest suggestion of vinegar on smelling it at the bung. Another fruitful source of infection to young wine is want of care in preserving the marc from contact with the air during fermentation.

There is only one cure for acescence, and that is pasteurisation or heating the wine to 150 degrees, and, unless for very small quantities, this is beyond the power of the Queensland vigneron. All other processes are simply temporary palliatives, for though the acidity may be neutralised the germs are left to turn the remaining alcohol into vinegar, and the wine will soon be as bad as ever. For a wine that is to be consumed quickly, the following is a good remedy:—Carefully rack the wine into a clean, well-sulphured cask; as most of the germs are at the surface of the wine, be very careful to stop the flow before the surface of the wine reaches the top, so that as few germs as possible pass over; fine with the whites of from 3 to 6 eggs for each 100 gallons according to the colour, if red wine; or with $\frac{1}{2}$ -oz. to 1 oz. of Nelson's isinglass, if white; rack again as soon as bright, being careful that *no sediment* goes over. If these instructions have been carefully followed out, the wine will have been freed of the greater part of the germs, and some little time will be required for the survivors to multiply sufficiently to continue the acetification, *if the wine has been racked into sulphured casks*. There remains the acidity to be got rid of; the best substance for this purpose is neutral tartrate of potash, as any form

of lime or magnesia will affect the colour and give a bitter taste. The dose will depend upon the amount of acidity in the wine, which should be tested by taking five measured quart samples, and into the first put 3 grains of the neutral tartrate, into the second 6, the third 9, and so on, dissolving the salt in a little of the wine, and well mixing. After a few days the effect will be produced, and the taste will tell you which is the correct dose, which then becomes a simple matter of calculation.

Under no circumstances mix acetified with sound wine, with the idea of diminishing the taste, as the good wine would be spoilt as well, unless the unsound wine has been pasteurised; and even then it is not quite safe to do so. Use every precaution to *prevent* the development of acescence.

TREATMENT FOR ANTHRACNOSE.

THE time is approaching when vigneron should adopt precautionary measures against Anthracnose or black spot, a fungus disease that causes considerable damage to grapes in wet seasons, and which is likely, unless kept in check, to spread with considerable rapidity. The remedy is cheap, easily prepared and easily applied, so that vigneron have no excuse for omitting this necessary part of vine cultivation. The man who has his vineyard infected with Anthracnose and neglects to apply the treatment is either too lazy to do so or is indifferent to the fate of his grapes and his vines.

A fortnight before the eyes of the spurs begin to swell—that is, when the sap is on the move—the vine should be well scrubbed down with a hardish brush from bottom to top with the following solution:—

Sulphate of iron, 5 lb.
Water, 1 gallon
Sulphuric acid, 4 oz.; or,
Sulphuric acid, 1 lb.
Water, 10 lb.

The last remedy has been found by repeated experiments in Europe to be just as efficacious as the first, and is easier to make. Vigneron would do well to try the effect of both the first time, and see which has the better action.

The solutions are best prepared in a wooden vessel, as a bucket or small tub, but a new kerosene tin will prove a serviceable and handy article for their use. Pour the water on the sulphate of iron, and then add the acid *very carefully* to avoid splashing; stir until the sulphate is dissolved—or for the second remedy pour the acid very gently into the water and stir. The point to be observed is to avoid splashing of the acid on the person or clothing.

Before applying the above solutions it is better to rub off all detached bark from the vine, which must be religiously burnt, as should be all the *débris* from the pruning, and last year's leaves, tendrils, &c., if they have not been already ploughed in. This is a very important point to which too much attention cannot be given: wood and leaves of last season swarming with germs ready to propagate next summer. If the eyes have already begun to swell, use a softer brush or a small wool mop, and be careful to leave no part of the vine untouched, but slop the solution well into all parts. Do not forget to apply the same to stakes to which the vines are tied.

Tropical Industries.

SUGAR-CANE FROM CHILDERS.

LAST month some magnificently grown canes of the Daniel Dupont and Rappoe variety were sent to the Department of Agriculture by Mr. John A. Innes, of Childers.

Three samples were sent, viz :—

Two canes (Daniel Dupont), eight months' growth, grown by Mr. Alex. Taylor.

Two canes (Rappoe), nine months' growth, and two of the latter variety ten months' growth.

The canes show some 10 feet of crushable cane, well grown and of good thickness, with very long joints. Our correspondent says that they are not picked specimens, but represent the average of the crop, amongst which still longer canes are to be found. Mr. Taylor's cane is third ratoon, and is evidence of the extreme richness of the Childers soil.

Of the two other varieties the second sample was grown by Mr. James McIlwraith, and the third by Mr. George Nixon. We have no information as to the area under crop in each case, but with fifty acres of such cane the proprietor should feel well satisfied with the return. We shall be pleased to learn what weight of cane has been obtained per acre as soon as the cutting is over.

Preparation of Meat Extracts.

By CHARLES R. VALENTINE.

WE have received from the Acting Agent-General, Mr. C. S. Dicken, the following interesting paper on "The Preparation of Meat Extracts," read at a meeting of the Society of Arts, London, on the 28th March, by Mr. C. R. Valentine:—

Almost exactly two years ago I addressed a gathering of your society here on the subject of the development of the trade of our colonies in dairy produce and the products of *petite culture*. If I felt some diffidence then, I must confess that I feel more diffidence to-day, because I fear I shall have to tell you a good deal that you know. I will, however, endeavour to do so without being wearisome, and in the hope that I may at least make suggestions that may be of use. I am going to deal with the production and use of meat extracts—so called—and to endeavour to show that Australasia may still further develop a useful and important and remunerative trade in a material that is now the basis of a host of dietetic preparations, the virtues real and fanciful of which are indicated by the advertisements that cover the walls of our streets and fill the pages of our newspapers and magazines *ad nauseam*.

(1.) I will first give some account of the history of meat extracts, and the causes that have led to their manufacture and use.

(2.) Then I will treat of the commercial aspect of this manufacture, and give some statistics of the colonies in which I think a very profitable trade may be further developed.

(3.) Then I will refer to preparations that are in fashion at present, and their general manufacture and composition.

Perhaps nothing strikes one more forcibly in visiting the great centres of food distribution in England than the changes that have taken place in the last thirty or forty years. These changes appear to be governed by the general rule—"the luxury of yesterday gradually becomes the necessity of to-day." To go back not a very long time, we can trace this evolution in the use of the universal vegetable, the potato, and in the abuse of that often harmful and nauseous decoction, stewed tea. These are instances of supply creating demand. The booming and advertising of *bouillons* and extracts of meat has led to something similar in the case of meat extracts, or, rather, "extracts of beef," all of which have their basis in the product I am about to discuss that is known by its Latin title, *extractum carnis*. Before dealing with its history, let me say at once that this raw material, the basis of these popular drinks, *bouillons*, and extracts, can be made in the colonies at a cost that will enable it to be placed on our market at a price within the reach of everyone. Hitherto the price has been quite prohibitive. Popularised in a still cheaper form, it will meet an increased demand, helped undoubtedly by the tendency of the age in this world of rush and hurry that requires everything to be ready to hand, with the minimum of labour and the maximum of quality. Until recently, even in the best kitchens, the use of "*extractum carnis*" was unappreciated, and the advantages of its application in the making of soups, hashes, stews, gravies, &c., overlooked. There is yet room for a great development in the form in which it is placed ready to the cook's hands—*i.e.*, in clean and easy form for use without being wastefully packed. From another point of view, the manufacture of useful and reviving beverages from "*extractum carnis*" is to be encouraged as an antidote to alcoholic stimulants, which flatter the weak heart "but to betray."

The development of our empire, too, is only now rendered possible by these portable and sustaining extracts. Pemmican and biltong were all very well, but now the question of whether an army corps can reach Coomassie with its available transport service, or whether a forced march beyond Berber, on the Nile, is possible, may depend upon such goods as are known by their epithets, "extract," "condensed," "compressed," &c. Lastly, in the sick-room and hospital, the value of a preparation of known strength, purity, and character may mean the saving of life. Scientifically made, there is no fear of a patient being nauseated by the watery infusion that many of us remember we have been compelled to swallow in our sick days of childhood, accompanied with its modicum of dry toast, until the very name of "beef-tea" has caused us to shiver. There being this extended use for a good meat extract in the kitchen, in the tented field, in the peaceful scientific exploration far from the base of supplies, in the sick-room, and in daily life, as the basis of a useful, palatable, and honest beverage, the corollary follows that there must be an ever-increasing demand and popularity. To meet this demand, we wish to place Australasia, and especially the cattle-rearing colonies of Queensland and New South Wales, in the forefront.

The idea of concentrating the body of an ox into a thimbleful of elixir must have been a very old one. May be, the love potions and philtres of ancient and medieval witches were merely strong *bouillons*, in which, when beef was scarce, "eye of newt and toe of frog" were used in the cauldron! Perhaps, in those days those came nearer to a true appreciation of the physiology of life sustenance who gave their patients raw meat. It must be remembered that meat extracts and concentrated foods are to meet the special circumstances of the sick, and not to supplant but to assist other foods with both them and the health. The work of Dr. Justus von Liebig in this respect has hardly met with its due appreciation. Certainly his name appears in various colours on different-shaped jars of different preparations, but the light he threw on the physiological action of food, upon its chemistry, and upon the concentration of its valuable constituents, has been forgotten and unappreciated, and, like Pasteur, the bulk of his life's work is overlooked, and his name is only familiar to many of us in connection with a minor result of his devotion to study for the benefit of humanity. Be this as it may, Liebig, who died exactly a quarter of a century ago on April 18, laid down certain great principles of the chemistry of food which hold equally to-day as when he enunciated them.

Years before Liebig, the celebrated physicians, Parmentier and Proust, endeavoured to procure a more extended application of the extract of meat; and Liebig, in his "Familiar Letters on Chemistry," published in 1859, quotes them, and shows how Parmentier had pointed out that extract of meat would offer to the wounded soldier a means of invigoration, and, with a little wine, "instantly restore his powers weakened by loss of blood." Proust speaks in similar terms. Now Liebig, ever with a keen eye to the practical when any new scientific truth was elucidated, pointed out fifty years ago nearly that from the continents of America and Australia, where beef and mutton had then only a nominal value, we could, with the simplest means, collect immense quantities of the best extract of meat, the importation of which, he adds, "might perhaps acquire a very peculiar importance for the potato-eating population of Europe." It is equally important with the right manufacture of a meat extract that the public should know exactly what it is, and its true place in dietetics. In touching upon this chemico-physiological aspect of the matter, it must be understood I only give the broad outlines, and that there are modifications of the principles laid down; but for my purpose, and for the purpose of the manufacture of "extractum carnis," these broad principles obtain to-day equally as they did when Liebig first laid them down.

When raw meat is finely chopped and macerated in the same weight of cold distilled water and squeezed out, the water dissolves from 16 to 24 per cent. of the weight of the dry flesh. The fibrine of the flesh is about three-

quarters of the solid residue. If the watery infusion be heated, the albumen of the flesh separates as a flocculent precipitate when the temperature of 133 degrees Fahr. is reached, and the red colouring matter of the blood, likewise albuminous, coagulates at 158 degrees. The infusion, after being freed by boiling from albumen and the colouring matter of blood, has the aromatic taste and all the properties of soup made by boiling the flesh. This is important to remember in our manufacture of extract. There is no idea harder to eradicate from the mind of the old-fashioned cook or housewife than that the longer she boils meat the more good she is getting out of it. She is a loose observer of facts. She is condensing the extract she has made, but she is only making the fibrinous albuminous part of the meat more recalcitrant than ever. Anyone who has boiled an egg is familiar with the coagulation of albumen, but the cook will not listen to anyone who points out a similarity between eggs and meat. Perhaps, the same spirit that rises superior to a little elementary chemistry inspires the vegetarian and the fasting ascetic with the self-comforting idea that in eating eggs they are loyal to their creed, whilst beef would be "anathema!" We return to the infusion of extract of flesh from which we have strained the coagulated albumen. This infusion when evaporated at a gentle heat becomes darker-coloured, finally yellowish-brown and acquires the flavour of roast meat. When it is dried up, there is obtained a brown, somewhat soft, mass amounting to 12 or 13 per cent. of the original flesh (suppose it had been dried). This is in the rough the outline of the process of extract-making.

We have rather overrun our ground, and must just hark back to a word or two about food. From the air and soil and the rain plants with the sun's aid build up their structures, and these contain, roughly speaking, two great classes of organic compounds, both necessary to the food of animals. These are (1) the carbohydrates, or non-nitrogenous, such as sugar, starch, cellulose, and the fats; (2) the nitrogenous (albuminoids), such as the gluten of flour, which is vegetable albumen, and the vegetable casein that is found in beans and peas. The plant is eaten by the graminivorous animal, and that animal is eaten by man. There are, of course, mineral matters in the plants which have important functions. You all know that nitrogenous food-stuffs are absolutely essential for the well-being of animals, and that without them the animal frame cannot be built up. Liebig illustrated this by calling attention to the fact that from the albuminoids of an egg develop all the parts of the animal body—feathers, claws, membranes, fibrin, blood-vessels, and so on. In the process the albumen disappears. Albumen then, he points out, is "the foundation of the whole series of peculiar tissues which constitute those organs which are the seat of vital actions. The elements of these organs which now possess form and vitality were originally elements of albumen." Albuminoids, then, must be present in every food which by itself suffices to support life. The meat or muscle of herbivora consists largely of solid albuminoids, and hence its importance as food, and it is this difficulty of albumen coagulation that stands in the way of the manufacture of an extract of meat that would be life-sustaining by itself. Methods have been adopted to overcome some of this difficulty by the restoration to the extract of the coagulated albuminoids, but in the ordinary "extractum carnis" of commerce the great bulk of the nitrogenous constituents of the meat is absent. If special claims are made for any preparation of it, these claims must be based upon constituents added to it by the manufacturers and patentees of the many preparations, excellent in their way, that are on the market.

The great principle to remember in the manufacture of meat extract is that, if flesh employed for food is to become again flesh in the animal body, as few as possible of the constituents of raw flesh ought to be withdrawn from it in its preparation for the table. It is not claimed for "extractum carnis" that it is a food. It is plain that if flesh be simply boiled in water and the meat eaten, much of its constituents have been lost, especially if it be put in cold water at first. It is possible, as I have shown above, to extract from finely

divided meat by the action of cold distilled water, a great deal of albuminous matter, and therefore cooks are warned not to steep fresh meat for long in cold or warm water. On the other hand, washed muscular fibre becomes hardened by boiling it in water, just as does the white of an egg. It is important, therefore, that the cook, if she wants tender meat, should drop it at first into boiling water, and thus form, outside the meat, a layer of hardened fibre and coagulated albumen, which keeps the other juices in the meat, and the albumen among the fibrinous parts inside. The meat should never be allowed to boil hard, but merely to stand and simmer. The effect on fibrine of boiling is, we must all remember, to increase its hardness and toughness. The same applies to the roasting of meat; the exterior should be rapidly heated, to form an envelope, as it were, to retain in the meat the interior juices. This is, roughly, the *rationale* of cooking, and it will enable my hearers to recognise that beef-tea is but a solution of the saline and extractive matters of beef, whilst the extract made by the Liebig process is an evaporated beef-tea containing, in a small volume, the extractive matters and the salts of a large quantity of beef, and in virtue of this, possesses medicinal and dietetic properties not to be despised. Considered alone as a food, it in no sense represents the meat which has yielded it, since it has lost the albuminous element. We will just destroy one other fallacy of the kitchen before passing on to our subject. A cook will judge of the "strength" of her stock by the fact that when cold it was a stiff jelly. Now, as far as nutrition is concerned and life-sustaining power, the thinnest, most watery-looking cold fluid may be of infinitely more value. The jelly is gelatine, differing nothing from any glue or the like extracted from the feet of cattle. Liebig, with other chemists, showed that gelatine itself has little or no dietetic value, in spite of the nitrogen it contains. It will not support life alone, nor will it even replace meat; 50 per cent. of it leaves the body without having helped towards its nourishment, and the remaining moiety goes partly to form fat, or passes away in the form of urea. It has, however, some value in a mixed diet. The cook's gelatinous soup is then not so "good," so "sustaining," as the watery amber-coloured fluid made from the maceration of minced raw beef with water. It is to some extent upon the intelligent method of making a true soup that the process of the manufacture of "extractum carnis" depends. Liebig macerated finely divided beef in cold water, or water heated up to about 150 degrees Fahr. This is evaporated to dryness in a water-bath, and forms the extract of beef. From some 32 lb. of lean beef, free from fat and bone, equal to 8 lb. dry meat and 24 lb. water, 1 lb. of true extract of beef can be made. Liebig further pointed out that of the true extract nearly 80 per cent. is soluble in alcohol of 85 per cent. In salting meat, the brine that forms contains all the elements of the extract, and you can therefore see what a wasteful plan it is to kill and salt down cattle to export salt beef. Salt beef is not a healthy food, it is bulky to export, and its better qualities have been running away in a useless brine, whilst the composition of the flesh is changed much more even than by boiling. "Extractum carnis," then, is free from fat and gelatine, whilst the beef of our kitchens contains both. If "extractum carnis" contained fat it would not keep, but become rancid; if it contained gelatine it is depreciated in value, for the best dry gelatine is only about half the price of extract of meat.

You will naturally ask what is the value of meat extract, as apparently its qualities, as referred to by me, would seem to be mainly negative, in that I have only said what it does not contain. Leibig saw in it the means of bringing to Europe some part of the food that was wasting at a distance for the want of anyone to eat it. At the time he wrote, lean beef in Australia was worth from $\frac{1}{2}$ d. per lb. to nothing; but he meant the extract to be eaten with liberal additions of bread, peas, or lentils; that is, with foods that contained nitrogenous constituents, in which the meat extract, by reason of the process of its manufacture, was, of necessity, lacking. To-day in the modern German factory this is being done. The famous erbwurst of the German soldier is peameal and meat extract with little bits of fat bacon chopped up in it. And

—let me mention it with some shame—the preserved vegetables the English troops took with them in the last Ashantee expedition were preserved in a German factory, where the meat extract is “strengthened,” literally, to-day by the addition of vegetables, peameal, &c., and made into appetising and sustaining soups. Thus, to-day Liebig’s idea is being carried out, and now the German soldier is supplied with his meat extract separately, and his peameal and bacon fat and nitrogenous vegetables to put in it. Vegetable albumen, in fact, is supplied separately to the soldier to put in his extract. At the same time, even “extract” with the vegetable albuminoids is not equal to the meat from which the extract is got as a life-sustaining diet.

The exact action of the extract alone is perhaps more that of a useful stimulant, and it is in its development in this direction that there seems to be very great opportunities for its extended use. Its physiological action is not perfectly understood, but seems to be akin to that of the action of the alkaloids of tea and coffee. The lowest and latest mixture—a *bouillon* made from “extractum carnis”—is retailed to-day at 6d., and the purchaser is obliged to take more than he requires for one cup or for a single person. In a ready, suitable, neat, and clean form the sale of extract of beef in small quantities sufficient for three-quarters of a cup of hot water should be a successful rival of the popular “pint of four ale.” The extract is, in fact, a substitute for flesh when taken with suitable accompaniments, the best of which, I should imagine, would be whole-meal bread, in which the wheat is not robbed of its vegetable albuminoid gluten, as too much of the fine flour is to-day. Popular as are the preparations of extract on the market, we can yet imagine what a wonderful demand might be created if the minds of the people became accustomed to use them, and had them placed before them in small cheap quantities that could be prepared even more quickly as a beverage than the dreadful decoctions of our railway refreshment rooms and restaurants called tea and coffee.

If the preparations of meat extract on the market are not legion, they are at least a battalion; and I may roughly divide them into four great sections:—(1) Extracts by the Liebig process, or modifications of it; (2) *bouillons*; (3) jellies; (4) juices.

Of the first we have Liebig’s Extract Company—“Liebig,” blue signature; “Ramornie” Liebig; “Tooth’s” Liebig; Baron Liebig, photograph brand; “Brand’s” Liebig; Cybels; Armour’s Extract (Chicago), modification of the Liebig process, whilst many large wholesale grocers and warehousemen put up the extract under their own names, and these are all on the Liebig system.

The second class we may call flavoured and medicated solutions, such as Bovril, Vimbos, Borthwick’s *bouillon*, Oxine. It is claimed for these that there has been restored to the extract some of the albuminoids that coagulation and straining have robbed it of. These are more of foods, but not so stimulating as the Liebig, because not so condensed. In the case of Oxine it is also claimed by the makers that vegetable matter is added.

The third class, the jellies. These are made by boiling down the gelatinous parts of meat, as well as the lean meat, until a jelly is formed, and this in many cases is fortified by the addition of the extract. In this class (jellies) the well-known Brand’s essence of beef might be included.

There are also a number of meat juices, under the names of Armour’s, Brand’s, and Valentine’s. The colour of this juice is reddish, which shows that in the preparation it has not been subjected to great heating. The makers claim special methods of manufacture. In some cases the lean raw meat is taken and minced, and an equal volume of water added; it is then squeezed under great pressure, and strained. The juice is then frozen, the water in it freezing out first, the excess of water being separated by a special process.

These are the only four classes of meat extract, and I may say of the first three of them that extract of meat is the basis of all. The popularising of these essences, *bouillons*, Bovrils, and Vimbos, &c., means that there is an increasing demand for extract. There are some “soup squares” made, but

they are manifestly largely gelatinous, with starchy and vegetable matters added, together with a small amount of extract. It is also to be borne in mind that a very dark extract is not necessarily a strong one, as the deep colour may be due to vegetable colouring matter. The keeping properties of extract are valuable, and the absence of the albumen has much to do with this characteristic.

There is a meat fluid made which consists of lean meat chemically treated with acid and peptone, by which all the fibrin, albumen, and gelatine are rendered soluble after being digested in water at a temperature of 100 degrees Fahr. It is treated with other chemicals to remove the bitter taste, and then evaporated, and as such represents certainly all the lean meat. But for manufacture on a large scale, and from a commercial standpoint the "extractum carnis" is a more profitable undertaking, in that its manufacture is simple, easily conducted in large bulk, and no somewhat risky chemical treatment is needed for its production. On a large scale, too, this condensed solution of beef would, I imagine, be an expensive product; "extractum carnis" can be made cheaply and well, and has a big market ready for it.

I think it only proper to refer to Brand and Company, who rank amongst the first producers of concentrated meats in this country. This house was founded in 1835 by a Mr. Brand, who had for many years been a cook in the kitchen of King George IV. Mr. Brand commenced business upon a modest scale in Little Stanhope street, and the goods he made a specialty of at first were chiefly *patés* and edible delicacies of varied kinds, supplied to an aristocratic *clientèle*. The business continued thus until 1845, when the concern was disposed of to a Mr. Withall, who carried it on upon the old lines until 1861. In that year his friend, Dr. Druitt, urged him to endeavour to perfect and introduce to the medical profession some form of nutriment that patients might take in lieu of medical stimulants, and which should embody the large amount of invigorative power in a small compass. Experiments were undertaken, and the result was the introduction of what is now known as "Brand's Essence of Beef." This preparation has from that time to the present day enjoyed an increasing sale, and Dr. Druitt was its first introducer to the faculty, he bringing it before the Obstetrical Society of London in May, 1861. The "Essence of Beef" and the "Concentrated Beef Tea" formed a nucleus around which other specialties have since been gathered, and from that time onward the house has progressed upon its new basis with remarkable success, playing a most important part in the production of special articles of diet for invalid use. In 1873, Mr. Withall transferred the business to its present proprietors, Messrs. Thomas Deuce and John James Mason, the latter of whom had for many years been the superintendent of the culinary department.

I will deal now with the stock statistics of Queensland and New South Wales. We have no figures relating to the import of extract of meat. It is lumped together with "meat preserved otherwise than by salting," in the Board of Trade returns, and this country pays a bill of £2,000,000 per annum under that head. It is not likely that the trade from the United States will greatly develop, its vast trade in cattle and beef being the line which is more suitable. We paid the United States of America and Canada nearly £10,000,000 for live cattle last year, besides £4,609,000 to the former for fresh beef. The trend in Argentina, too, seems to be towards live cattle and fresh beef export. It is to be noticed, too, that there has recently been a considerable advance in the value of stock in the United States of America, and this concurrently with an increase in number. Let us not forget America's vast resources—in Texas alone there are 1,000,000 more cattle than in the whole of England, and a cow there is only worth from £3 12s. to £4, other cattle being valued at under £3. In Australasia, in 1895, there were, roughly, 12,000,000 cattle, nearly 7,000,000 of these being in Queensland and 2,250,000 in New South Wales. New Zealand carries over 1,000,000 head, and is increasing her herds rapidly, possessing as she does immunity from disease. For the United States of America, 50,000,000 is a moderate estimate; and Argentina

must have getting on to 40,000,000, for she had 23,000,000 six years ago, and the development has been rapid. In 1895, Argentina sent to us 12,213 cwt. of "beef preserved otherwise than by salting," the United States of America sent 253,261 cwt. of the same, and Australasia 171,000 cwt.—a very respectable quota indeed. Roughly speaking, nearly all this came from Queensland and New South Wales, in the proportion of two-thirds of it for the former and one-third for the latter. It may just be noticed in passing that figures recently issued show that in 1897 the exports of live cattle from Argentina were 238,121 head, or 144,418 fewer than in 1896. At the same time the frozen beef export increased from 2,997 tons to 4,241 tons. But as there was a decrease of 9,668 tons of jerked beef, as compared with the exports of 1896 from Argentina, the result is that in 1897 the aggregate exports of beef altogether show a considerable decline. Now stock in that country have been much improved by the large purchases of English bulls, and it is apparent that the trade was checked by cheapness here, whilst probably there has been, by reason of the improvement of stock, an appreciation of value over there. It would appear that Argentina will eventually send the bulk of her beef here as chilled meat of high class. I will place the other beef exports to England of these countries and colonies side by side for the same year:—

				Cattle. 1896. No.	Fresh Beef. 1895. cwt.
Argentina	...	...	...	65,708	23,384
United States	...	...	...	393,548	1,649,473
Australasia	...	...	...	32	502,168

Queensland, especially, with her large surplus of cattle, has developed the meat extract trade considerably, and that this is so is largely due to the foresight of Mr. C. G. Tindal and Mr. Tooth, two of the pioneers of the Australian preserved meat industry. The former's name is identified with the celebrated Ramornie brand, and he has latterly devoted much of his attention to the extract trade. From Queensland alone in 1895 there were exported 474,746 lb., valued at £43,000. There is one advantage about the extract trade, too, that I may notice. Tinned and preserved meats have dropped in value by reason of the great development of the fresh meat trade. Extract does not enter into competition with either. It has its own market; it is *sui generis*; it is the luxury becoming the necessity.

A great many colonists are looking at the trade with longing eyes, and there is something of a rush into it in the colonies referred to because of the manifest advantages. There is all the more danger of the trade being injured by loose methods of manufacture. The trade can no more afford this than could the dairy trade, and it is of the utmost and absolute importance that Australian "extractum carnis" shall earn and maintain the highest character. The utmost care in manufacture is necessary, for one ounce spoiled by burning affects the whole bulk. There must be the latest machinery for cutting the lean meat, hydraulic pressing, perfect cleanliness, perfect command over the temperature of the buildings and apparatus, cleanly and quick disposal of the offal, fat, &c., and no accumulation of the meat awaiting treatment. The beef must be freshly killed, mature, but young beef fed in good condition so as to carry the maximum of lean flesh. Cattle over three years of age, and not over four years, are, in fact, the best for the purpose, and are those from which the maximum quantity can be made. The meat is stewed by steam (I use the word in preference to "boiled") in a jacketed vessel, and the concentration of the clear soup is generally done in vacuum pans. Every detail is of the utmost importance. An essential point is the cooling of the meat after killing, and, as in the dairy, a perfect command of the temperature is needed. Meat chopped and laid aside in bulk very soon begins to "change." A first-rate extract cannot be made except from the best, cleanest, and sweetest meat. None other but the best is wanted in England. The business lends itself to the co-operative method among stockowners supplying the extract factory, and

this especially in the disposal of the by-products. There is all the fat, which has various uses, the meat of the head, neck, &c., the heart, liver, tongue, sweetbreads, blood, entrails, hide, switch, bone, feet, horn, &c., all severally valuable commercially; and on the disposal of these or preparations of them in the rough as marketable commodities, such as glue, tallow, cured skins, charcoal, manure, &c., will depend to a great extent the stock-raiser's profits. It is not a trade that anyone can rush into, and it must be begun on a perfect system. An ordinary fat bullock gives 400 lb. or so of lean meat, which produces about 10 lb. of extract. It varies in price, and it only pays to make the best. The importance of the by-products will be recognised as a big factor in the commercial success of an undertaking of this nature. In Chicago, where, of course, immense numbers of cattle are slaughtered, the by-products are turned to the best account in a systematic way, and the exporters even of the prime beef depend largely upon these for their profits. The skin of the head with that of the legs and tail goes to the glue factory; the cheeks are used for Bologna sausages; the tongue is pickled and smoked; the skull goes to the glue-house and is boiled, and then to the fertiliser factory; the feet make glue and neats-foot oil, and the bones of them go for tillage; the sweetbreads are used to make pancreatin; portions of the liver and heart are used for sausages; the blood goes to the makers of fertilisers, and the horns are made into knife-handles, buttons, and combs. It is through the saving and utilising of absolutely every portion of the bullock that the packer can make his business pay as it does, and, as an example of the completeness and economy with which all by-products of thousands of stock are utilised, I cannot do better than refer to Mr. P. D. Armour, of Chicago. At Armour's works this utilisation of by-products is carried on to perfection. There is absolutely no waste. The country butcher in England, who kills two bullocks a week, lets more run to waste than is lost in the disposal of 100 head at Armour's.

The first samples of extract that came from Australia were very good, but as new packers rushed into the trade a deterioration was noticed, due to improper treatment and careless selection of the meat, and to the neglect to expel all the water, or carelessness in heating and consequent burning. The latest appliances of mechanical skill must now be used as in the dairy, and rule of thumb and guess work must give way to science and exactitude. In the best constructed and managed works in the colony every care is exercised in the selection and treatment of the meat; and where the rough and ready idea of slumping any kind of stuff on to the market has been prevalent, it is luckily killing itself by the inexorable logic of £ s. d., for the margin of values between the best and the very ordinary extract means a price either of 4s. 6d. or 2s. per lb. The next essential to absolute cleanliness is the necessity of getting the whole of the animal heat out of the fresh killed beef. The cooling chamber is a necessity, and so is the regulation of the temperature of the manufactory in which the manipulation of the meat takes place. The age and sex of the animals have a good deal to do with the quality of the extract, preference being given to bullocks three years old or a little over. It has been found that at this age the yield of extract is the best; below that age, or above it, the best results are not generally obtainable. Of course extracts can be made from veal and young animals, and with proper care they are not too gelatinous, and are nice for a change of diet. The meat being properly cooled, it is jointed and the flesh cut up into cubes, and it is important that at this stage it should not be allowed to remain long heaped up in great quantities, or a taint will develop. In 1867, Dr. Thudichum, at the meeting of the Food Committee of this society, explained the principles that make this important. The colouring matter of the muscles is called myochrome, and is identical with the colouring matter contained in the blood. Dr. Thudichum pointed out that this aids in the breathing of the muscles during life, and some time after death. As long as meat is in an eatable condition this matter remains, so to say, alive. Hence a butcher takes care to let his

meat "breathe." If the meat were shut up close after being killed, it would become putrefied in a few hours. Piled up, the big heaps of imperfectly cooled minced beef would soon develop taint. The cubes of meat should be uniform in size, and this is now cut up by machinery. The meat is then put in a jacketed boiler, as I have said, with its own weight of water, the heat being raised to 175 degrees Fahr., and it is kept stewing for about twenty minutes. It requires constant attention and stirring to prevent any possibility of burning, and the regulation of the heat must be nicely adjusted.

It is then taken out and strained, the residue is pressed and squeezed, and the liquid put into a vacuum pan, and concentrated down to the desired mass, a brown pasty substance containing from 13 per cent. to 16 per cent. of water. If cooked too long in the first process, and if the albumen is not carefully strained out after coagulation, the extract will contain more moisture and the presence of albumen will deteriorate its keeping properties. The pure extract is wanted, and not a stocky, sticky, gelatinous mass. In some cases the mass, after being heated, is put into bags and the whole of the liquid pressed out by hydraulic or heavy pressure, so that the residue left is like nothing more than a piece of blotting-paper or gun-wad. There is little doubt that the latter system is the best, for the extract then contains the full forces of the meat, whereas by the straining process a good deal is left in the residue. Some works have been rather chary, however, of adopting the latter method through fear of too gelatinous and "stocky" extract resulting. Stocky extracts are not wanted in England, and can always be made here, as they are done, in the form of jellies and soups, to which extract is added. The reason the meat is not kept at a high temperature for a long time is to prevent the decomposition of the gelatinous matter in the fibre, and its inclusion in the extract. Extracts (as shown in the table of analyses) should generally consist of about 16 per cent. water, 53 per cent. of extractive soluble in alcohol, 13 to 14 per cent. of extractive insoluble in alcohol, and 18 per cent. or more animal matter. The extract consists of inorganic and organic substances, the former being chiefly and generally alkaline phosphates and chlorides—chiefly phosphate of potash and chloride of potassium, with possibly some ammonia as the base of a phosphoric acid compound. The organic parts of the extract are kreatine, or kreatinine, and gelatinous extractive. A good extract should always have an acid reaction, its colour should be a characteristic yellowish-brown, and it should have an agreeable meat-like odour and taste. It should be entirely soluble in cold water, and should be free from albumen, fat, and gelatine.

The big centres of the manufacture of extract of meat are Chicago, Buenos Ayres, Queensland (Townsville, Rockhampton, Gladstone, Bowen, Brisbane), New South Wales (Ramornie), Sydney (Meat Preserving Company), New Zealand (Hawke's Bay—Nelson Brothers). The practical methods of manufacture are broadly on the same lines everywhere, but each centre has some little plan or convenience in operation that has been discovered in actual working, and formed the basis of some invention. A South American factory consists of a large, cool, dark, flagged hall kept scrupulously clean. Here the meat is weighed and passed through apertures to the meat-cutting machines of special design, that can get through an incredible amount of work. Hence the meat is passed into digesters, which hold about 12,000 lb. each, and it is "digerated," as it is termed, in a description of the commercial Liebig process, by high pressure steam, 75 lb. to the square inch. The liquid is then run to a series of fat-separators. Here the fat is separated in a hot state because no time can be lost in cooling it for that purpose, as decomposition sets in so very quickly. In clarifiers below the separators, the albumen and fibrin are coagulated out, and the liquor then run into large evaporators where vacuum evaporators evaporate the extract at a very low temperature, the liquor being filtered several times before it is run into the evaporators.

In Bovril, we are told by the founder of this convenient form of putting up beef extract with other things, Mr. J. Lawson Johnston, that he hit upon a system of adding the albumen and fibrin to the beef extract in the form of a

desiccated powder. Probably the success of this *bouillon* as a popular beverage was due mainly to the fact that for the first time the public were enabled to buy a cup of decently made and invigorating beef-tea cheaply over the counter. "Johnston's Fluid Beef" found much help in its sale at first, owing to the Scott Act in Canada, and a hot cup of Bovril was no mean substitute for hot spirits when the sale of alcoholic drinks was prohibited. Others have followed in the wake of Mr. Johnston, and have adopted packages which are similar in appearance, and cannot help but be looked upon as a colourable imitation of the first popular *bouillon* on the market. It is rather a pity that the inventors of similar preparations have not struck out a new line in the shape and style of bottles and jars.

The slaughter of cattle on the River Plate and Rio Grande districts is about 2,000,000 head annually. The South American process is briefly much that which I have described above. The arrangements for slaughtering the cattle in great numbers and for dressing them with the utmost despatch are very complete, and the meat used is carefully selected. The basis of Bovril and other *bouillons* is, as we have said, the extract of beef. It is claimed, however, for this and other mixtures that the elements that coagulate in the liquid extract are restored with the manufacture of the finished article in England, and that the dried albumen and fibrin are sent over in hermetically sealed tins and worked back into the mixture here.

It is significant of the even greater development which may wait the Australian trade that many of the large manipulators give preference to the finest Australasian extract, as it possesses a greater fullness and, if anything, a finer flavour than the South American.

COMPARATIVE ANALYSES OF VARIOUS FORMS OF EXTRACTS OF MEAT.

—	Liebig's Process or Modifica- tions.	Bouillon.	Meat.	Jellies.
Water	16.54	29.14	89.15	51.80
Sodium chloride	3.11	14.12	0.26 }	7.50
Other salts	19.63	3.38	1.04 }	
Organic matter	60.72	53.36	9.55	40.70
In the Organic Matter.				
Albumose	22.62	28.60	4.00	7.0
Gelatin	0.25	0.56	1.71	13.0
Flesh Basis and Decomposition Products	37.85	24.10	3.84	14.8

DISCUSSION.

Mr. G. G. MACWILLIAM said he was bound to express his obligations to the reader of the paper for the information he had given, and for the very interesting views he had shown. Although he had existed upon the extract, he did not know there was such gigantic machinery employed in its production; and certainly those who had perfected the process deserved the warmest thanks of all who did not care for heavy feeding. It was a very important industry in the colonies so far as he could gather from the various companies already existing, and, judging from some others which were about to be formed, the trade was going to be much larger. He was glad of it, for there never was a time when soup could be so nicely and so generously made as at the present day, thanks to these admirable extracts. This industry would be largely developed ere long in other countries besides New South Wales, Queensland, and New Zealand. The grazing capacities of West Australia were being rapidly increased, and Queensland would find there a strong competitor. From Albany up as far as Wagga he felt sure that in five years' time there would be a considerable number of factories erected, because the cattle would by that time be very largely increased. They need not be alarmed at that, however, for the public inclination not only in England but in other countries was to make more and more use of this excellent addition to the food supply.

Mr. JOHN M. DONALDSON (Messrs. Armour and Co.) said he also desired to express the pleasure he had experienced in listening to this paper. In talking of the care which was exercised in the manufacture in order to ensure purity, Mr. Valentine might have referred to the difficulties encountered by those who endeavoured to maintain a high standard in the face of competition by those who were less scrupulous. Many of them would like to see meat extract included in the list of articles to be dealt with by the Adulteration Bill now under consideration. It seemed to him that all articles of food, whether carefully corked and capsuled or sold loose, should be subject to analysis, and a high standard of purity maintained, otherwise their usefulness would be lost and public faith in them would cease.

The CHAIRMAN said he thought probably the most important part of the paper was the strong recommendation that the extract itself should be made in the colonies and sent to Europe without any admixture of gelatine, fibrinous material, or other things which might be enumerated, the mention of some of which might not be very agreeable. Beef was distinctly better for the purpose than mutton for many reasons; the melting point of mutton fat being an insuperable objection to making the best quality of extract from it. The important point was that the pure extract of meat should be sent over, and afterwards certain things might be added which would make it more useful for dietetic purposes. He might remind them that properly made extract of meat administered to the human subject was of extreme value, but it could not properly be termed a food. It was in the nature of a nerve stimulant, and might be given to the human machine when working quietly, underworked rather than overworked. In dealing with a community that had to use either its brains or its muscles, extract of meat was no more food than alcohol, by itself; it required to have something mixed with it which gave more force than the mere stimulating action of the soluble constituents of flesh, which were largely saline matters. There were a number of excellent preparations for that purpose, and the results were promising, though he must say that he had found some of the most vaunted preparations of the least value. That might be due to the fact that the necessary amount of fibrinous or gelatinous material to be added had not yet been exactly ascertained. The moment that you added to the extract any of these less easily digested substances you raised the temperature of the machine, gave it more work to do, and got power out of it. He believed it would be possible to make a preparation from beef which would give practically all the power which could be got out of roast meat, but it would not be done in a moment. The facility with which good extract of meat could be made, the advantages of easy division or dosage, so that a single cup of *bouillon* or beef-tea could be made at a moment's notice, and even cold water would do if you could not get hot, was a considerable step. If you had a perfect extract to begin with, and were able to add to it a sufficient amount of that material which went most largely to the formation of muscle—by which he did not mean glue, but a form of gelatine and of nitrogenous material, which was much more easily digested than glue—then you would have a preparation which would be of the greatest possible value as a food. He was not sure that in the case of those who had to get their living more by their brains than by physical work such a preparation would not be the best form of getting into the system the nitrogen required. When you came to athletic sports and hard outdoor work, the power of digesting other things came into play, and one could digest what in future would perhaps be termed a comparatively crude diet; but for those in big cities who had to use their brains much and work against time, such preparations would undoubtedly be of the greatest possible value. He would also like to give a note of warning with regard to the deterioration which had been referred to, for it would be a great misfortune if the nutritive value of the preparation were diminished in the attempt to put it on the market at the lowest possible price. He would conclude by proposing a hearty vote of thanks to Mr. Valentine, who had been exceedingly modest as to his own part in the work.

The vote of thanks having been carried unanimously,

Mr. VALENTINE, in reply, said it had been a great pleasure to him to prepare the paper, and he hoped it might be of some use in putting the extracts of meat from the colonies on a better footing as to quality. He had not mentioned Western Australia, Victoria, South Australia, or Tasmania, because he had only dealt with those colonies in which the production was being largely carried on at present, but he was quite conversant with the facilities which the other colonies possessed. One great object in bringing forward the Australasian colonies was to show that they had the means of supplying this raw material on the cheapest possible basis. In the United States he could not but think that the rapidly increasing population would soon consume a much larger proportion of the output. He fully endorsed what had been said about adulteration, and was convinced that if the law were applied to these extracts it would give the high-class manufacturers a much better chance. He must say, from the very prominent advertisements which appeared about the blending of certain materials with others to increase their nutritive value, that some of the statements made were altogether unwarranted. His view was that the exportation from the colonies should be confined to the "extractum carnis," as anything which required to be added could be obtained and manipulated better in this country. His opinion was that the extract was a "pick-me-up," and about the best oil one could apply to grease the wheels of the human machine.

Forestry.

SOME TIMBER TREES OF QUEENSLAND.

No. 4.

By J. W. FAWCETT,

Member of the English Arboricultural Society.

THE GREY GUM (*EUCALYPTUS SALIGNA*, Sm.)

BOTANICAL DESCRIPTION.—The Grey Gum is a tall majestic-looking tree with a straight stem or trunk reaching to a height of from 60 to 150 feet, with a circumference of from 3 to 5 and even as much as 10 and 12 feet.

Bark.—The bark is smooth and shining and of a silvery grey colour, rather thick and deciduous, shedding in thin longitudinal strips. It is more or less fibrous near the butt, often so much so as to render the tree very like a Woollybutt (*E. longifolia*, Link.).

Leaves.—The leaves are alternate or opposite, lanceolate, thick, from 3 to 6 inches or more in length, much narrowing towards a sharp point, with numerous fine transverse parallel veins.

Flowers.—The flowers are not large, from 6 to 8 in number, at the end of an angular flowerstalk. They are whitish-coloured, and appear from November to January.

Fruit.—The fruit is semi-ovate or subglobose-truncate. Seeding time is from May to July.

VERNACULAR AND BOTANICAL NAME.—The Grey Gum is one of the Eucalypts which has the misfortune to be known by a host of different names. Different districts have different names for one and the same tree, and the unreliability of the colonial names for most of our timber trees is one of the greatest imperfections in Australian botanical nomenclature. The Grey Gum (so called from the colour of its bark) is also known as Blue Gum (in some parts of South Queensland and New South Wales—a misnomer), Grey Box, Flooded Gum, Redwood (from the colour of its timber), White Gum, and Woollybutt (from a confusion caused by its resemblance in the butt at times to the true Woollybutt, *E. longifolia*, Link.). The specific name, *saligna*, which is a Latin word signifying a Willow, was given to it by Sir J. E. Smith (the purchaser of the Linnean herbaria and the founder of the Linnean Society), who considered that of the few species of Eucalypti then known this one mostly resembled in its foliage the Willow; hence the name, which, however, is far from being a happy one.

DISTRIBUTION.—The Grey Gum is essentially an inhabitant of the open forest lands of the higher situations, and is usually plentiful on forest ridges, especially in the coastal districts. It is also at times found on rich soil along many of the river banks. It is confined to the coastal districts of New South Wales and Southern Queensland.

USES.—The Grey Gum furnishes an excellent timber, of a greyish colour, very tough and hard. It is closely grained, strong, and very durable. It is largely used for shipbuilding purposes, especially as masts, planks, and spars. Being straight in the grain it is easy to work, and is therefore, for a hard wood, a great favourite with carpenters, and is extensively used for building purposes, such as battens, scantlings, weatherboards, flooring-boards, shingles, &c., and for naves and felloes of wheels. It is one of the lightest of the Eucalypts, floating in water shortly after being cut. It is also easily sawn, but it shrinks a good deal in drying. It is one of the most durable of Australian timbers, and has been known to be sound after forty years' burial in the ground. It is

in great repute for posts and rails in fencing, as it does not readily take fire. It is one of the best of fencing timbers against the attacks of white ants, and fencing posts have been known to be good after twenty-five years' service. Though far superior to many of the timbers accepted as suitable for railway sleepers, it is rarely taken, on account of the bolts working loose in the timber, which in good ironbark they never do.

It yields a dull reddish gum, which contains 35·56 per cent. of kino-tannin.

Being one of the finest of Eucalypts, of rapid growth, and lofty in stature, its pillar-like trunk being often devoid of branches for three-fourths of its entire height, as well as often ornamental in its habits, it is a tree well worthy of cultivation.

THE BLACKBUTT (*EUCALYPTUS PILULARIS*, Sm.)

BOTANICAL DESCRIPTION.—The Blackbutt is a very large tree, generally growing straight and tall, and attaining a general height of from 60 to 150 feet, with a circumference varying from 8 to 15 feet or more. On good soils it attains a height of as much as 200 feet, with a diameter of as much as 15 feet. It attains perhaps the biggest bulk of any tree in Australia.

Bark.—The bark is brownish, or somewhat dark-coloured, and somewhat furrowed persistent and fibrous, especially on the base of the trunk and on the main branches—that on the upper portion of the trunk and of the smaller branches being deciduous, or falling off in stripes, leaving them smooth.

Leaves.—The leaves are alternate or opposite, mostly lanceolate, tapering from the base towards the point, more or less curved, sometimes nearly straight, from 3 to 6 inches long, smooth and thick, with numerous fine rather oblique parallel veins.

Flowers.—The flowers are from 6 to 12 in number, and appear in bloom from September to December.

Fruit.—The fruit is semi-globose or subglobose in shape, and from a quarter to nearly half an inch in diameter. Seeding time is from March to June.

VERNACULAR AND BOTANICAL NAME.—The Blackbutt (so called from the dark colour of its butt or lower portions of the trunk) is also known as the Blackbutted Gum and Flintwood (the latter name being given to it from the hardness of the timber when in a dry state). The specific name, *pilularis*, was given to it by Sir J. E. Smith (the founder of the Linnean Society) from the subglobose fruit. It is, however, not well chosen, as other species of Eucalypti have fruits more pillular in shape.

DISTRIBUTION.—The Blackbutt is usually a tree of the open forests in elevated districts, but is also found on level country near rivers, especially in the coastal districts. It is found more or less along the eastern seaboard of Australia from Gippsland, Victoria, to North Queensland.

USES.—The Blackbutt furnishes an excellent and valuable timber of a light-grey or pale-grey colour, and is hard, tough, and durable. It is one of the strongest of Australian timbers, will stand exposure, and is not liable to rot in the ground. It is close and very straight in the grain. It is much used for house carpentry (especially as flooring-boards), in shipbuilding (decking and planking), for wharves, piles, bridges, and culverts, and any purpose where strength and durability are required. It is extensively used for fencing purposes, splitting into posts, rails, and even palings very easily. It is also used for telegraph poles and ships' masts, and to some extent for railway sleepers. It is useful for wheelwright's work, and is one of the best timbers for woodpaving. It also furnishes one of the best of charcoals.

Its liability to gum-veins has prejudiced the timber of the Blackbutt in public favour. When free from them, it is second in point of durability, hardness, and strength only to Ironbark. From observations of the timber of this tree, I think that the veins exist only in the butt portion of each tree (that

part covered with the rough bark), and are found chiefly in old trees. Except when thoroughly dry, it furnishes but an indifferent fuel. In seasoning it shrinks a good deal, but warps very little. Fencing posts have been known to last for fifteen and twenty years, and rails for a much longer period. It is very liable to the attack of white ants; indeed, many trees are hollow, or "pipey," and infested with these insects. Trees growing on dry open ridges furnish the best timber.

The bark, though inferior to stringybark, is useful for roofing and flooring bush buildings. When exposed, however, it does not last long, but when under cover it hardens and lasts a long time.

The tree yields a kino of a ruby colour, quite transparent, and entirely soluble in spirit or water. It contains about 64·00 per cent. of kino-tannic acid.

The Blackbutt is a tree of very rapid growth, and the leaves of the young saplings are opposite, sessile, and of a lanceolate shape. It commences to flower at from about five years of age. A ship's mast 60 feet in length and 14 inches square has been obtained from a tree twenty-one years of age. It attains the biggest bulk of any tree in Australia, and in the sister colony (New South Wales) there are some giant specimens of this tree. The following are three of the largest:—

1. The "Bulli Big Tree," situated on the Bulli Mountains, a little below the "Elbow," forty-two miles south of Sydney, said to be the largest tree in New South Wales. Girth, from buttress to buttress, at ground 57 feet 6 inches; girth at 3 feet above the ground, 45 feet; girth at 6 feet above the ground, 40 feet; estimated height, 90 feet (the head is broken off). Measured March, 1891, by J. H. Maiden, Consulting Botanist, Sydney.

2. A tree in the Illawarra district. Girth, 45 feet; height about 300 feet. Measured by Messrs. Camara and Kirton.

3. A tree at Gosford. Girth, 25 feet at 6 feet from the ground; height, 156 feet.

Query.—Are there any giant specimens of Blackbutts in Queensland? If so, can any readers furnish particulars as to girth, height, and situation?

General Notes.

AMERICAN CIGARS.

STOGIES AND TOBIES.

It takes the visitor from the East a long time to understand the Pittsburg toby, otherwise known as the stogie. The man who thinks no gentleman should—and, in fact, that no gentleman can—smoke anything but an imported Havana cigar, is surprised at the ubiquitousness in Pittsburg of the plebeian, cheap-smoking stogie. To see a well-dressed, well-groomed man, who from appearances should be an emulator of those who want the best in the smoking line, puffing with apparent pleasure a long, ragged-looking apology for a cigar, is at first sight a shock to the nerves of the average smoker from other cities. He might be tempted to believe that the rough-looking cigar is a truer index to the social standing of the smoker than his clothes and language and bearing, but a brief acquaintance with the man would dispel this belief, and to sample his rugged-looking “smoke” might reduce the critic to the condition of enjoying one himself. There are cases on record of New Yorkers who once smoked two-bit cigars, but who went to Pittsburg, saw, smoked, and were conquered by the stogie, became devotees to its use, and looked back with wonder and regret to that period in their existence when only an imported Havana was worthy to be placed between their lips.

When Pittsburgers read in *The Sun* that Speaker Reed had been seen in the House lobby at Washington smoking a stogie they were not a bit surprised; it was rather a proof to them that the Speaker knew a good smoke, and they had a feeling of commiseration for the tardiness with which he had become acquainted with the stogie's qualities. Once the toby, or stogie, was known only in Pittsburg and Wheeling, W. Va. By degrees its fame and use sped to near-lying towns, and from these points inherent good qualities carried it far and wide, though nowhere is it smoked with the assiduity that is practised in the two cities named. High and low, rich and poor, smoke stogies in Pittsburg and Wheeling. Of course, those who can afford use imported cigars, but even the lover of the finest perfecto is glad to vary his favourite indulgence with an occasional whiff from a mild stogie.

The words “stogies” and “toby” are synonymous, but the latter term is applied exclusively in Pittsburg. However, the dealers there are now using the word stogie, as being the more correct and wider-known appellation. The smokers themselves in the two centres of the stogie trade cling tenaciously to the term used in their respective cities. In Wheeling a toby is known as a stogie, in Pittsburg the stogie is known as a toby. No Pittsburger would “go back” on his town so far as to say stogie, and the Wheelingite is just as particular not to say toby. Toby and stogie look alike, smoke alike, and are alike, but they bear different names according to the place of manufacture. Wheeling folks justify the use of the word stogie by an ancient tradition.

One firm alone in Pittsburg turns out 200,000 tobies every workday in the year. There are many brands of tobies or stogies, but there are but two kinds, the “seed” toby and another that is called in Pittsburg the “Wheeling” toby. The latter is made of strong Kentucky tobacco, for which reason it is called in Wheeling the “Kentucky stogie.” They are made mostly in Wheeling, whence the name used in Pittsburg. The seed toby is manufactured from tobacco grown from Havana seed in Connecticut, Virginia, and Lancaster county, Pennsylvania. It is mild, and many more of that variety than of the Wheeling stogie are smoked. Of course, seed tobies are also made in Wheeling.

Manufacturers say that the tobies made in Pittsburg are superior to those from Lancaster county, as the Lancaster tobies are made of Lancaster tobacco only, whereas those manufactured in Pittsburg are made chiefly of the Connecticut and Virginia seed. The seed tobies are subdivided into "mould" and "handmade." In some shops, it is feared, mould tobies are made from sweepings, but in the better-class factories the tobacco for them is cut and cleaned by machinery, and the "rankness" of the tobacco is driven off by a hot-air treatment. On account of the expense of preparing the cut tobacco, mould tobies are rarely cheaper than the handmade, although the working men who "roll" the latter receive better wages than the girls who make the mould tobies. One says "cigar-makers," but it would be heresy to call the toby-makers anything else but toby-rollers. Mould toby-rollers earn from 5 dollars to 9 dollars a week. The average wages of hand-rollers are 15 dollars to 18 dollars a week.

That the toby or stogie is not a fine cigar, the price, three and four for 5 cents, makes evident, but they are made of real, pure tobacco. No flavouring or colouring extracts are used, as the tobacco is too cheap to justify that. Cheap as they are they must be good, for how else could one explain the wonderful spread of the toby in the last few years, and the magnitude to which the industry has grown.—*Baltimore Sun*.

A BRITISH OPINION OF QUEENSLAND.

THE colony of Queensland has now become a regular exporter of butter to Great Britain, some 300 tons having been shipped during this season. This butter has competed on fairly favourable terms with the produce from Victoria, New Zealand, and other colonies. Some of this Queensland butter has been sent to Glasgow, where it was at once snapped up at highest prices, the light colour making it very suitable to the requirements of that city. The Darling Downs is the principal dairying district in Queensland. The Downs are an undulating tableland, about 2,000 feet above the sea-level, with the main line from Sydney to Brisbane running through them. They have an area of something like 4,000,000 acres of the richest agricultural soil in the world—soil ranging from 10 feet to 60 feet in depth, and as fertile as the Delta of Egypt or the river bottoms of Siberia. The climate is perfect, water is abundant everywhere, a network of running creeks on the surface and artesian waters under the surface. The district is meant by Nature to be a land of wheat and maize and lucerne, of fat cattle and rich dairies, and crowded homesteads. In some parts the farmer can grow two crops in one year, maize sown in January being ripe in April, and wheat sown in May being fit for the sickle in December. The Queensland Government has already taken power to repurchase these rich lands, and subdivide them; and "a century hence the Darling Downs may be a sunnier and more populous Kent."—*Durrant's Press Cuttings*.

THE SUGAR-BEET IN GREAT BRITAIN.

At a meeting of the Central and Associated Chambers of Agriculture, London, the subject of the cultivation of the sugar-beet in Great Britain was discussed on the introduction of Colonel Milward, who presented some interesting facts and figures upon the subject. While admitting that the production of beet sugar in this country would not pay so long as export bounties were granted on Continental sugar, he said there was good reason to believe that these bounties would soon cease to be paid in Germany and France, though it was doubtful whether the separate bounty on production in the latter country would be given up. He called attention to the numerous experiments carried out for years past in England, Scotland, and Ireland, as proving that excellent crops, containing a fair percentage of sugar, could be grown. A paper prepared by Mr. G. Shack Sommer, circulated at the meeting, gave a summary of experiments carried out from 1889 to 1895, inclusive, from which it appears that crops ranging from over 14 tons to over 26 tons have been grown in Great Britain containing from 2 tons to 3 tons 14 cwt. of sugar per acre. Mr.

Sommer, however, reckons 15 tons per acre as a fair average crop, and allows 8 tons of beetroot to 1 ton of sugar. The crop would pay the farmer well at £1 per ton for the roots, especially if he got back the pulp for feeding purposes; but, as the average price of beet sugar in 1897 was only £8 15s., it is obvious that the manufacture, at such prices for roots and sugar, would be carried on at a loss. A resolution was unanimously passed at the meeting asking the Board of Agriculture to exercise supervision over the experiments in the growing of sugar-beet to be carried out in many English counties this season, and to have analyses made when the roots are ready.

TO MEASURE THE HEIGHT OF TREES.

THE height of a tree may easily and simply be ascertained, on a sunny day, in the following manner:—

Take a stick, say 2 feet in length, and place it upright in the ground. It will throw a shadow of different lengths according to the height of the sun. Assume that it throws a shadow 3 feet long. Now measure the shadow thrown by the tree. A simple proportion sum will do the rest. If a shadow 3 feet long is thrown by a stick 2 feet long, how long should the stick be to throw a shadow 25 feet long?

The formula is—

$$\frac{25 \times 2}{3} = \frac{50}{3} = 16\frac{2}{3} \text{ feet.}$$

which is the height of the tree.

Another equally simple method is given by E. Coveney, in the *Journal of Horticulture*:—

Take three laths, the same as bricklayers use for tiling, and nail them in the shape of the framing; B B must be of equal length; B and a being placed on



the ground, the eye must follow up the longer lath (*d, d, d*) until it is in a line with *e*, the top of the tree or object you wish to measure. The frame must be placed as level with the bottom of the tree as possible. Should the ground be very uneven, you must give and take accordingly. You will see that *a* to *c* is the same length as *c* to *e*, and thus the height of the tree is obtained.

HOW TO TREAT BONES.

THE following information regarding farm methods of treating bones, where no crushing-mill is available, has been furnished, in reply to a query from a correspondent to a Melbourne paper, by Mr. A. N. Pearson, the Victorian Government Agricultural Chemist:—

Bones in country districts, where crushing-mills are not available, may be reduced by means of caustic, lye, quicklime, or freshly calcined wood ashes.

A simple plan is to pack the bones layer by layer, with freshly calcined wood ashes, in a barrel, and keep the mixture moistened for some months. Casks may be kept in constant use for this purpose on a farm, receiving every few days a fresh layer of bones and of ashes.

A quicker method is to boil the bones in an iron or copper boiler together with strong caustic lye. The proportions of bones and lye to be used are not exact or invariable. Roughly speaking, five parts by weight of caustic soda, or seven parts by weight of caustic potash, dissolved in fifteen parts by weight of water, should disintegrate about fifteen parts by weight of bones by two or three hours' boiling.

If the bones be allowed to remain in the caustic liquor, even without boiling, they will, in the course of a week or so, become disintegrated.

Another method of softening bones is by mixing in heaps with quicklime and loam. A layer of loam 4 inches deep is made, and on this is placed a layer about 6 inches deep of bones, and above this a layer 3 inches deep of quicklime. The layers of loam, bones, and lime are repeated in succession until the heap reaches a convenient height, when it is finally covered with a thick layer of earth. Holes are then bored in the heap from the top, and water poured down them to slake the lime. The mass will become hot, and remain so for two or three months, after which the bones will be friable, and the whole heap may be mixed up, and is ready for the ground.—*Adelaide Observer*.

DANGER IN TINNED FRUIT.

OPEN a tin of peaches, apricots, cherries, or other fruit—for all fruit is acidulous—let it stand for some time, and the fruit acids and the tin are ready to do their work of poisoning. A chemical knowledge that tells just how the dangerous compound is created is unnecessary to an avoidance of the peril. The rule to follow is never to make lemonade or other acidulated drinks in a tin receptacle, nor allow them to stand in such a vessel; and in the case of tinned fruits or fish, immediately upon opening the tin turn the contents out upon an earthenware plate, or into a dish that is made of earthenware or glass. Fruits in hermetically sealed tins, if properly prepared, germinate no poison. As soon as opened, the action of the acid on the tin, with the aid of the atmosphere, begins, and in a short time the result is deadly poison. This brief treatment of the question should be remembered by everyone, and its instructions followed.

CURE OF MANGE IN HORSES.

IN Vol. II., Part 3, of the *Journal* we gave a simple recipe for mange in horses. We have since been informed by Major Moore, police magistrate at Warwick, that the recipe is an excellent one, as he applied it to a horse of his own, which was badly affected, with the result that all sign of mange has disappeared. People often fail in curing diseases of domestic animals, because they either apply remedies intermittently or they take no care to give the animal the necessary protection from weather and rest from work whilst under treatment. We shall be pleased to hear of other cases of cure.

AGRICULTURAL AND HORTICULTURAL SHOWS.

THE Editor will be glad if the secretaries of Agricultural and other Societies will, as early as possible after the fixture of their respective shows, notify him of the date, and also of any change in date which may have been decided on.

LIST OF AGRICULTURAL, HORTICULTURAL, AND PASTORAL SOCIETIES AND ASSOCIATIONS IN QUEENSLAND.

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Allora ...	Central Downs Agricultural and Horticultural Association	J. H. Buxton...	
Beaudesert ...	Logan and Albert Pastoral and Agricultural Society	M. Hinchcliffe ...	6 May
Beenleigh ...	Agricultural and Pastoral Society of Southern Queensland	Wilson Holliday ...	30 Sept.
Birthamba ...	South Kolan Agricultural and General Progress Association	G. W. Nixon ...	
Blackall ...	Barcoo Pastoral Society ...	F. Clewett ...	
Boonah ...	Fassifern and Dugandan Agricultural and Pastoral Association	J. A. McBean ...	28 April
Bowen ...	Bowen Farmers' Club ...	J. B. Thuman ...	
Bowen ...	Pastoral, Agricultural, and Mining Society ...	J. E. Smith ...	8 June
Bowen ...	Preston Farmers' Association ...	R. A. Foulger ...	
Bowen ...	Proserpine Farmers' and Settlers' Association		
Brisbane ...	Horticultural Society of Queensland ..	G. K. Seabrook ...	21 and 22 April
Brisbane ...	Moreton Agricultural, Horticultural, and Industrial Association	J. Duffield ...	
Brisbane ...	Queensland Acclimatisation Society ...	E. Grimley ...	
Brisbane ...	Queensland Fruit and Economic Plant Growers' Association	G. K. Seabrook ...	
Brisbane ...	National Agricultural and Industrial Association of Queensland	H. C. Wood ...	
Brisbane ...	Queensland Stockbreeders' and Graziers' Association	F. A. Blackman ...	
Brisbane ...	United Pastoralists' Association ...	Fredk. Ranson ...	
Bundaberg ...	Bundaberg Agricultural and Pastoral Society	A. McIntosh ...	
Bundaberg ...	Bundaberg Horticultural Association ...	H. E. Ashley...	
Bundaberg ...	Woongarra Canegrowers' and Farmers' Association	H. Cattermull ...	
Burpengary...	Burpengary Farmers' Association ...	C. H. Ham ...	
Caboolture ...	Caboolture Farmers' Association ...	G. Mallet ...	
Cairns ...	Barron Valley Farmers' and Progress Association	W. F. Logan...	
Cairns ...	Cairns Agricultural, Pastoral, and Mining Association	A. J. Draper ...	
Charleville ..	Central Warrego Pastoral and Agricultural Association	A. J. Carter ...	25 and 26 May
Charters Towers	Towers Pastoral, Agricultural, and Mining Association	W. Tilley ...	
Childers ...	Isis Agricultural Association ...	H. Epps ...	
Childers ...	Childers Progress Branch, Isis Agricultural Association	N. Rosenlund ...	
Childers ...	Doolbi Mill Branch, Isis Agricultural Association	W. T. H. Job ...	
Childers ...	Childers Mill Branch, Isis Agricultural Association	H. Epps ...	
Clermont ...	Peak Downs Pastoral, Horticultural, and Agricultural Society	F. Leysley ...	
Clermont ...	Peak Downs Dairymen and Settlers' Association	A. G. Pursell ...	
Cooktown ...	Cook District Pastoral and Agricultural Society	W. R. Humphreys ...	
Currajong ...	Currajong Farmers' Progress Association ...	Wm. Howard ...	
Cunnamulla ...	South Warrego Pastoral Association ...	J. Winward ...	
Gayndah ...	Gayndah Agricultural and Horticultural Association	J. C. Kerr ...	
Gin Gin ...	Pastoral and Agricultural Society of Gin Gin	E. K. Wollen ...	
Gladstone ...	Gladstone Pastoral and Agricultural Association	W. J. Manning ...	
Gooburrum, Bundaberg	Gooburrum Farmers' and Canegrowers' Association	W. J. Tutin ...	
Goondiwindi	MacIntyre River Pastoral and Agricultural Society	A. Gough ...	
Gympie ...	Agricultural, Mining, and Pastoral Society	F. Vaughan ...	14 and 15 Sept.
Gympie ...	Gympie Horticultural Society ...	W. G. Ambrose ...	
Helidon ...	Helidon Scrub Farmers' Association ...	J. C. Collins ...	
Herbert River	Halifax Planters' Club ...	H. G. Faithful ...	
Herbert River	Macnade Farmers' Association...	E. C. Biggs ...	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Herbert River	Ripple Creek Farmers' Association	J. W. Grimes ...	11 and 12 April
Herberton ...	Mining, Pastoral, and Agricultural Association	John M. Hollway ...	
Hughenden ...	Hughenden Pastoral and Agricultural Association	W. H. Mulligan ...	10 and 11 May
Ingham ...	Herbert River Farmers' Association	Bryan Lynn ...	
Ingham ...	Herbert River Pastoral and Agricultural Association		
Ipswich ...	Ipswich and West Moreton Agricultural and Horticultural Society	P. W. Cameron ...	1 and 2 June
Ipswich ...	Queensland Pastoral and Agricultural Society	Elias Harding ...	
Kandanga (near Gympie)	Kandanga Farmers' Association	N. Rasmussen ...	27 and 28 July
Kolan ...	Kolan Canegrowers' and Farmers' Association	C. Marks ...	
Laidley ...	Lockyer Agricultural and Industrial Society	John Fielding ...	
Loganholme...	Logan Farming and Industrial Association ...	F. W. Peek ...	12 April
Longreach ...	Marathon District Pastoral and Mining Society	Neil McPhie ...	
Lucinda Point	Victoria Farmers' Association	W. S. C. Warren ...	27, 28, and 29 July
Mackay ...	Agricultural, Pastoral, and Mining Association	F. Black ...	
Mackay ...	Pioneer River Farmers' Association	E. Swayne ...	
Maryborough	Maryborough Horticultural Society	H. A. Jones ...	
Maryborough	Wide Bay and Burnett Pastoral and Agricultural Society	G. Willey ...	
Milbong ...	Milbong Farmers' Association	T. R. Garrick ...	
Mitchell ...	Mitchell and Maranoa Pastoral, Agricultural, and Vinegrowers' Association	H. J. Corbett ...	
Mosman River	Mosman River Farmers' Association	..	
Mount Mee...	Mount Mee Farmers' Association	R. Thomas ...	
Mulgrave ...	Mulgrave River Farmers' Association	Thos. Swan ...	
Nerang ...	South Queensland and Border Pastoral and Agricultural Society	W. J. Browne ...	
North Isis ...	North Isis Canegrowers' Association	W. J. Young ...	
Pialba ...	Pialba Farmers' Association	J. B. Stephens ...	
Pinbarren ...	Pinbarren Agricultural and Progress Association	H. Armitage, senr. ...	
Rockhampton	Central Queensland Farmers' and Selectors' Association	T. Whitely, Coowonga	
Rockhampton	Central Queensland Pastoral Employers' Association	G. Mackay ...	
Rockhampton	Central Queensland Stockowners' Association	R. R. Dawbarn ...	10 and 11 May
Rockhampton	Rockhampton Agricultural Society	R. R. Dawbarn ...	
Roma ...	Western Queensland Pastoral and Agricultural Association	H. K. Alford ...	10 and 11 May
Roma ...	Yingerbay Farmers' Association	F. E. Glazier ...	25 Aug.
Rosewood ...	Farmers' Club	F. H. Adams ...	
Springsure ...	Queensland Pastoral Society	G. R. Milliken ...	
Stanthorpe ...	Border Agricultural, Pastoral, and Mining Society	Geo. Simcocks ...	
Stanthorpe ...	Stanthorpe Horticultural and Viticultural Society	Jas. Scully ...	
St. George ...	Balonne Pastoral and Agricultural Association	T. M. Cummings ...	
Toowoomba	Darling Downs Horticultural Association ...	H. Hopkins ...	
Toowoomba	Drayton and Toowoomba Agricultural and Horticultural Society	H. Symes ...	2, 3, and 4 Aug.
Toowoomba	Royal Agricultural Society of Queensland ...	F. Burt ...	
Townsville ...	Townsville Pastoral, Agricultural, and Industrial Association (formerly North Queensland Pastoral and Agricultural Association)	J. N. Parkes ..	
Wallumbilla	Wallumbilla Farmers' Association	P. W. Howse ...	
Warwick ...	Eastern Downs Horticultural and Agricultural Association	J. Selke ...	6 Aug.
Wellington Point	Wellington Point Agricultural, Horticultural, and Industrial Association	J. B. Blaine ..	
Woombye ...	Woombye Fruitgrowers' Association	P. S. Hungerford ...	
Woowoonga	Degilbo Progress Association	F. A. Griffiths ...	
Woowoonga	Woowoonga Scrub Farmers' Association ...	H. B. Griffiths ...	

The Markets.

AVERAGE PRICES FOR MAY.

Article.										MAY.		
										Top Prices.		
										£	s.	d.
Bacon	...	...	...	...	...	...	...	...	lb.	0	0	7
Bran	...	...	...	...	...	...	...	...	ton	4	18	9
Butter, First	...	...	...	...	...	...	...	...	lb.	0	1	1 ⁵ / ₈
Butter, Second	...	...	...	...	...	...	...	...	„	0	0	9 ³ / ₈
Chaff, Mixed	...	...	...	...	...	...	...	...	ton	3	12	6
Chaff, Oaten	..	...	...	...	...	...	...	...	„	4	10	0
Chaff, Lucerne	...	...	...	...	...	...	...	...	„	3	10	7 ¹ / ₂
Chaff, Wheaten	...	...	...	...	...	...	...	...	„	2	16	3
Cheese	...	...	...	...	...	...	...	...	lb.	0	0	5 ⁵ / ₈
Flour	...	...	...	...	...	...	...	...	ton	14	2	6
Hay, Oaten	...	...	...	...	...	...	...	...	„	3	16	3
Hay, Lucerne	...	...	...	...	...	...	...	...	„	2	12	6
Honey	...	...	...	...	...	...	...	...	lb.	0	0	1 ⁷ / ₈
Japan Rice, Bond	...	...	...	...	...	...	...	...	ton	19	10	0
Maize	...	...	...	...	...	...	...	...	bush.	0	2	10 ³ / ₄
Oats	...	...	...	...	...	...	...	...	„	0	3	8 ¹ / ₄
Pollard	...	...	...	...	...	...	...	...	ton	5	7	6
Potatoes	...	...	...	...	...	...	...	...	„	7	17	6
Potatoes, Sweet	...	...	...	...	...	...	...	...	„	2	7	6
Pumpkins, Table	...	...	...	...	...	...	...	...	„	2	6	3
Sugar, White	...	...	...	...	...	...	...	...	„	15	15	0
Sugar, Yellow	...	...	...	...	...	...	...	...	„	13	10	0
Sugar, Ration	...	...	...	...	...	...	...	...	„	12	2	6
Wheat	...	...	...	...	...	...	...	...	bush.	0	4	10 ¹ / ₃
Onions	...	...	...	...	...	...	...	...	cwt.	0	10	7 ¹ / ₂
Hams	...	...	...	...	...	...	...	...	lb.	0	0	9
Eggs	...	...	...	...	...	...	...	...	doz.	0	1	3 ¹ / ₆
Fowls	...	...	...	...	...	...	...	...	pair	0	2	11 ¹ / ₄
Geese	...	...	...	...	...	...	...	...	„	0	4	11 ¹ / ₄
Ducks, English	...	...	...	...	...	...	...	...	„	0	2	4 ¹ / ₂
Ducks, Muscovy	...	...	...	...	...	...	...	...	„	0	3	10 ¹ / ₂
Turkeys, Hens	...	...	...	...	...	...	...	...	„	0	5	6
Turkeys, Gobblers	...	...	...	...	...	...	...	...	„	0	11	4 ¹ / ₂

ENOGGERA SALES.

Article.								MAY.		
								Top Prices.		
								£	s.	d.
Bullocks	...	...	...	...	...	...	...	4	13	1 $\frac{1}{2}$
Cows	...	...	...	...	...	...	...	2	12	2 $\frac{1}{4}$
Wethers, Merino	...	...	...	...	...	...	...	0	9	7 $\frac{1}{2}$
Ewes, Merino	...	...	...	...	...	...	...	0	6	4 $\frac{1}{2}$
Wethers, C.B.	...	...	...	...	...	...	...	0	12	2 $\frac{1}{4}$
Ewes, C.B.	...	...	...	...	...	...	...	0	10	3
Lambs	...	...	...	...	...	...	...	0	10	4 $\frac{1}{2}$
Baconers	...	...	...	...	...	...	...	1	10	0
Porkers	...	...	...	...	...	...	...	1	7	8
Slips	...	...	...	...	...	...	...	0	7	0

Farm and Garden Notes for July.

Farm.—This is the best month for sowing lucerne. Few weeds will be growing to choke the young tender plants, an occasional shower occurs to assist germination and growth, and the heat of the sun is not too great. If not already done, plough and properly prepare the land for potatoes, maize, oats, barley, rye, vetches, tobacco, sugar-cane, carrots, mangel wurtzel, swedes, canaigre, &c. Early potatoes, sugar-cane, and maize may be planted in early districts, but it is risky to plant potatoes this month in any district liable to late frosts, and in low-lying ground it is better to wait till the following month. The worst loss in potatoes and sugar-cane we ever experienced was in September, when heavy frosts occurred on the low lands. In the North, rice may be sown in suitable weather.

Kitchen Garden.—Should showery weather be frequent during July, do not attempt to sow seeds, as the land will be liable to clog, and hence be injurious to the young plants as they come up. The soil should not be worked until fine weather has lasted sufficiently long to make it friable. Never walk over the land during wet weather with a view to sowing. The soil cakes and hardens, and good results cannot then be expected. This want of judgment is usually the cause of hard things being said about the seedsman.

Plant out onions. When these are sown in beds, there is great risk of their being smothered by winter weeds, which give very little trouble in the open field; therefore get the onions planted out as quickly as possible. Asparagus roots may now be planted. Sow cauliflower, the main carrot crop, beans, lettuce, endiocradish, spinach, &c. Keep the hoe going constantly between the rows, and you will not have much trouble with weeds except on the very richest soil.

Flower Garden.—Winter work ought to be in an advanced state. Fill up all blanks, and thin out where overcrowded. Turf and top-dress lawns. Lay and repair verges, and keep all walks in good order and condition. Sow annuals, everlastings, nasturtium, larkspur, dianthus, snapdragon, cosmos, cornflower, &c.

Orchard Notes for July.

By ALBERT H. BENSON.

THE pruning of all kinds of deciduous fruit trees should be completed during this month. All prunings should be gathered and burnt, and the trees should then receive a good winter spraying with the sulphur, lime, and salt wash. After pruning and spraying, the orchard should be ploughed, so as to bury all trash and weeds that have accumulated, as well as to sweeten the soil and break up any pan that may have been formed by summer cultivations.

Citrus trees from which the fruit has been gathered should also be gone over carefully; all dead branches or branches with borers in them should be cut out and burnt. The inside of the tree should be thoroughly well thinned out, care being taken not to open up the head too much. As a general rule the pruning of citrus trees is greatly neglected in this colony, the trees being allowed to grow into a dense mass, which forms the best possible harbour for all kinds of scale insects and a breeding ground for various fungus diseases. Such trees cannot be kept clean by spraying, as it is impossible to get the spraying material used on to all parts of the tree. On the other hand, when the inside of the tree is well thinned out, there is little harbour for pests, and those that are present can be reached by spraying. In the Orchard Notes for June, I recommended a dressing of sulphur, lime, and clay or fine flour, to be applied as a paint to the trunks and main branches of citrus and other fruit trees after they have been pruned; and I can only repeat what I then said, viz.:—That where San José, Greedy, Mussel, or Parlatoria scales of deciduous trees, and Red, White, Circular, Black, Mussel, or other scale insects, and fungus growth of all kinds of citrus trees are present, this method of treatment is even more efficacious than the sulphur, lime, and salt spray for deciduous trees, or the resin, soda, and fish-oil wash for citrus trees. Painting the trunks and main branches does not, however, do away with the necessity for spraying, as the smaller branches, twigs, and leaves can only be reached by means of the spray-pump. The best results are obtained by painting the large wood and spraying the rest of the tree. Planting can be continued throughout the month. Don't plant too deep; the depth at which the tree stood in the nursery row is the right depth to plant. Cut back hard when planting; don't be afraid that you will spoil your tree, as if you don't cut back hard you will never get a symmetrical well-grown tree, and your failure to cut back will always tend to injure the future growth and vigour of the tree.

Don't plant rubbish, and only plant those trees that your soil and climate are adapted for. Remember that the climatic conditions of this colony, with the exception of the Stanthorpe district, are altogether different to that of the colder parts of the southern colonies, and that therefore we cannot grow the same fruits here in our tropical and semi-tropical districts that are grown successfully in the south. I wish to call the attention of all fruitgrowers to this very important matter, as during the past few weeks several thousand fruit trees have been imported into Queensland from the southern colonies, many of which are quite unsuitable to the districts to which they have been sent, and the planting of which will only cause disappointment and loss to those persons who have purchased them. The trees themselves are good, and provided that they were grown in a suitable climate would produce good fruit, but they are quite unsuitable for the greater portion of this colony. I especially wish to warn fruitgrowers and intending fruitgrowers not to plant varieties that

are unsuited to the climate, and advise all such to consult the Department of Agriculture as to the suitability or otherwise of the fruits they wish to plant, as I am certain that they will find it to their advantage to do so.

It costs just as much to prepare the land for and to plant, prune, and look after an inferior variety or a variety of fruit that is unsuitable to the climate, and from which no return of any value will ever be obtained, as it does to grow a variety that is suitable to the climate and that will produce superior fruit that will meet with a ready sale; therefore, no fruitgrower can afford to spend time and money growing unsuitable varieties, and the sooner that this is realised the better for the fruit growing industry of this colony.

Cultural Notes for Tropical Queensland.

[The Cultural Notes for Tropical Queensland, kindly supplied by Mr. E. Cowley, Kamerunga State Nursery, are given a month in advance, for the obvious reason that the *Journal* cannot reach some parts of the far North until the month of issue is well-nigh over, and hence the monthly notes would be valueless until the following year.]

AUGUST.

GINGER should be unearthed, together with any late yams and turmeric. Chicory (which, however, is not a tropical plant) can now be unearthed. Fields and gardens should both be cleared of weeds. Cane crushing will now be undertaken by most mills, and the crop well in hand. Plantings of cane tops may be made, the ground being prepared beforehand. The tops of canes containing least saccharine matter will retain their vitality longer than other portions of the cane. The remainder of the Arabian variety of coffee should be gathered; the trees being pruned, the very long primaries may be cut back seriously where no secondaries are showing; the plantation must be kept clear of weeds. The kitchen garden in the tropics, if it has been well attended to, will give good results in temperate zone vegetables. It is now too late to plant English potatoes, but sowing for a crop of French beans may be hazarded. Annatto will ripen this month; secure the dye by rubbing the seeds in cold water, which may afterwards be boiled for a time and bottled for use. Field peas may be reaped. Cuttings of oats for green fodder finish this month. Scrub felling performed during this and the following month. Collecting and planting of *Manihot Glaziovii* seed.

Agricultural and Pastoral Conference.

FIFTH SESSION.

FRIDAY MORNING, 13TH MAY, 1898.

Business was commenced by the adoption of a motion, proposed by Mr. Sandrock, that in the discussion to take place that afternoon on the flying-fox pest, be included insect and other farm pests. After a short discussion about the consideration of subjects not on the printed programme and the order of the remaining business, the following papers were read:—

MAIZE-GROWING ON THE DARLING DOWNS.

[By Mr. W. D. LAMB, Yangan.]

Maize has for some years been one of the leading crops on the Darling Downs. The latest official figures giving detailed particulars of the maize crop are those for 1896. Why we are compelled to wait until August of each year for the returns of crops grown in the preceding year is a matter which might very well engage the attention of the Department of Agriculture with a view to bringing about some improvement in this respect. In the year 1896 the area cropped with maize in Queensland was 115,715 acres, which gave a return of 3,065,955 bushels, equal to nearly $26\frac{1}{2}$ bushels per acre. Of this large quantity nearly one-third was grown on the Downs, or rather that portion of the Downs stretching along the western slope of the Dividing Range from Toowoomba to Killarney. Warwick produced 263,613 bushels; Toowoomba, 260,613 bushels; Allora, 253,326 bushels; Killarney, 117,170 bushels—or a total of 894,722 bushels. Though the details for the past year are not yet available, the preliminary return published by the Registrar-General some time ago gives the area planted with maize in 1897 as 112,854 acres, yielding 2,784,942 bushels, being a decrease of 2,861 acres cultivated and 280,391 bushels yielded. When the details are available it will probably be found, however, that the decrease occurred, not on the Downs, but in the districts on the coast side of the Range. The 1897 crop of maize about the Warwick and Killarney end of the Downs was a good one, and when, towards the end of the year, there sprang up a sudden demand for grain for the Sydney market, between 40,000 and 50,000 sacks were obtained without difficulty (chiefly from the Killarney branch railway) and sent forward by rail. Many special trains laden entirely with maize were despatched from Warwick to Wallangarra, *en route* to Sydney. The best soil for maize is a free loam, such as creek flats and upland scrub. Over 100 bushels per acre is a common crop on such land in a fairly good season. The scrub lands along the foot of the hills of the Main Range from Gladfield to Killarney are specially suited for this crop, an area embracing some thousands of acres of rich volcanic soil originally covered with thick scrub. Any fairly good soil will grow maize, but will not yield so large a return per acre. The method of maize cultivation on the older cleared lands is to plough the land in winter, say July to September; let it lay fallow until spring; then cross-plough. The ploughs most commonly used are two and three and up to six furrow, drawn by from four to twelve horses. In old land the depth ploughed is about 6 inches the first time and a lighter depth the second time, the object being to get a good seed bed on the previous season's soil, which, being thoroughly aerated, gives the maize a better start. On new downs grass land, the ground is broken up at the same time as above, but only to a depth of 3 inches to 4 inches, and in the second ploughing a little deeper. This puts the upper soil down deep enough to form a good seed bed. The land is then treated similarly in both cases and harrowed down fine, harrows covering up to 16 feet wide being mostly used. The time for planting on the Downs is from the middle of September to the middle of December. Drilling, instead of the old method of opening furrows and planting by hand, is most in favour. Drills that plant two rows at a time are preferable, as, having large travelling wheels, they are not liable to

clog up with the sticky black soil. All the recent American grain drills have appliances for planting maize either for grain or green feed. The width between the rows varies from 4 feet to 4 feet 6 inches, and in some cases to 5 feet. The usual depth for planting is about $1\frac{1}{2}$ inches in the early part of the season, and up to 3 inches and over as the soil gets warmer. The varieties planted are mostly of the kinds imported by the Department of Agriculture at different times, which have been found to do well on our Downs country. Some growers prefer hill planting to single grain planting and *vice versa*. My experience of hill planting *versus* single grain is that hill planting is not so liable to blow down after cobbing, and that there is not such a tendency to suckering. I have not noticed any difference in the yield; but in cultivating for the next crop the hill roots are more troublesome. After planting, the land is harrowed and then left until the corn can be seen in rows, when it is run over with a light or blunt-toothed harrow to disturb the young weeds amongst the plants. Very few plants will be injured if the horses are not allowed to tread on them. After a few more days the maize is again run through with a scuffler or disc harrow, the latter implement being most in favour on level land, as, by the plough-like motion of the discs, it throws just sufficient soil round the maize plants to smother any weeds that may be left growing after the harrowing, and it has the advantage over the horse hoe that two horses can be hitched to it, one on each side of the row, and the driver can ride and smile. After being run through once or twice, it is laid by until it is ripe. Harvesting is done by pulling off the cobs from the stalks with the husk on and throwing them into convenient heaps, when a dray or wagon comes along and carts them to the shed, or, more commonly, into a heap in or near the field. Then the thresher comes along in the shape of a machine that is capable of husking, shelling, cleaning, and bagging ready for market up to 1,200 bushels per day. The machine is drawn about by a traction engine, which also drives it when at work. The engine draws the machine into its place, then backs off to its place behind the thresher, the belt is put on, the elevator to haul up the cobs is run out to the heap, and also one to stack the husk and cob. Three men with iron scoops take their positions at the heap and two men at the bags. The whistle is sounded, the engine starts, and down comes the clean maize into the bags at the rate of 100 bushels per hour. Nineteen-twentieths of the maize on the Southern Downs is now threshed by this kind of machine, as it is so much cheaper than the old method. The total cost of threshing to the farmer is now $1\frac{1}{2}$ d. per bushel as against 6d. to 8d. by the old method. Machines for harvesting maize have been tried, though so far they have not proved a success, as the cost of labour is too heavy; but I have every reason to believe that a self-binding corn harvester will very shortly be placed on the market. One ordered by the Hawkesbury College was on exhibition at the last Warwick show, and I understand that our Department of Agriculture has one at Westbrook. Provided we could get a machine to cut two or more rows at a time and bind them into sheaves, and some inventive genius comes along with a machine that will thresh the whole lot, we would get some thousands of tons of good fodder which is at present wasted, as at present the stalks are either cut with a mower or a hoe, raked up, and burnt. The following is an estimate of the cost of growing and marketing one acre of maize on the Downs and profit at present ruling price. The estimate of yield, I think, is a fair one, taking an average for, say, five seasons:—

Estimate of Cost of Growing 1 Acre of Maize on the Darling Downs and Return for Ditto at Present Price for a 40-bushel yield.

Dr.						£	s.	d.
Rent of land	...	...	...	...	...	0	10	0
First ploughing	...	...	...	...	...	0	4	0
Second ploughing	...	...	...	...	...	0	3	0
Harrowing	...	...	...	...	...	0	1	0
Planting	...	...	...	...	...	0	1	6
Harrowing twice at 9d.	...	...	...	...	...	0	1	6
Disc harrowing twice	...	...	...	...	...	0	2	0
Pulling maize	...	...	...	...	...	0	3	0
Carting maize	...	...	...	...	...	0	2	6
Threshing 40 bushels, at $1\frac{1}{2}$ d. per bushel	...	...	...	...	...	0	5	0
Drawing to rail	...	...	...	...	...	0	3	6
Ten bags, at 5d. each	...	...	...	...	...	0	4	2
Seed maize	...	...	...	...	...	0	0	6
Balance	...	...	...	...	...	2	8	4
						£4	10	0
Cr.								
By 40 bushels maize, at 2s. 3d. per bushel	...	...	...	...	...	£4	10	0

—(Applause.)

WHEAT-GROWING.

[By P. HAGENBACH, Warwick.]

I arrived in Queensland in 1862, and in February of that year found myself at Toowoomba. After a six months' sojourn there, I went on to Warwick, where wheat-growing was being prosecuted on a larger scale than in the neighbourhood of Toowoomba. Among the pioneers of wheat-growing at the Warwick end of the Downs were the late Mr. Thomas Jeffries, of Rose Hill, and the late Mr. James Morgan, of Summer Hill. The first flour-mill in Queensland was erected at Warwick by Messrs. Charles Clark and Co., a very complete establishment for those days, when, of course, the modern roller process of reduction was unknown. The pioneer mill, then known as the Ellinthorpe, has in recent years passed into the hands of the Dominion Milling Company, who have equipped it with a complete installation of steam-roller machinery, and, though the oldest mill in the colony, it is to-day quite up-to-date in every respect. During the early days of the wheat-growing industry, failures were frequent. Rust, which early made its appearance, was the wheat-growers' worst enemy, as it will probably be found to be in the early days of wheat culture in Central Queensland. But the Downs growers were not deterred by early failures. They kept on obeying the old injunction to "try, try, try again," and the result of their sturdy perseverance is seen to-day in the thousands of acres cropped annually with wheat on the Downs and the flour-mills at work in all the principal towns from Roma and Warwick to Maryborough. Yet another mill is in course of erection in Rockhampton, and it should not be long before Central Queensland produces sufficient grain to keep it going. Downs land intended to be laid down in wheat is ploughed in January or February, if the weather permits, so as to have the soil in good condition by seed time. There are two methods of sowing—(1) the old style of broadcasting with the hand, and (2) the modern method of drilling it in with machinery. Drilling is, in my opinion, altogether superior to broadcasting, because the seed is planted more evenly and at a uniform depth, and because less is required than when sown by hand. Moreover, the crop grows in rows, and this gives free play to the air, which is conducive to health. After the seed has been sown, if the weather holds dry, the land ought to be rolled, as by this means the soil is compacted, and what moisture there is below is retained. The crop ripens in November, and the reaper and binder is then put into the field. In fine weather one of these machines—worked by two teams of horses in half-day shifts—will cut and bind wheat at the rate of ten acres per day. Two good men will "stook" as fast as a machine can cut and bind. The crop should be left in the stook for at least a week, to allow it to get thoroughly dry. When this stage has been reached, carting and stacking may begin, and care ought to be taken that the stacks are well built and made thoroughly water-tight, as should moisture find entrance much of the grain will be ruined. Threshing is done on the Downs with steam-power plants, of which there are eight or ten in the Warwick district. These perambulate the district, going from farm to farm to treat the crops. Four of the plants are drawn and worked by large traction engines, which at other times of the year are employed husking and threshing corn, baling hay, cutting chaff, threshing lucerne seed, &c. The output of one of these plants varies from 150 to 250 sacks of wheat per day. From twelve to sixteen men are employed with each plant, and they are paid at the rate of 6d. per working hour. When the grain leaves the threshers it is ready for the markets, and as a rule the millers buy freely. It is generally a case of first come first served, and often those who are late with their threshing have to wait some months till the millers work off stocks before they can get rid of their grain. A word or two as to the risks which attend wheat-growing and the means adopted to avoid some of these may not be out of place. First, as to smut. The presence of this renders wheat unfit for milling. Smut can, however, be prevented by steeping the seed in a solution of bluestone. One pound of bluestone is sufficient to treat four bushels of grain. Some farmers sprinkle the bluestone solution over the grain; but I am of opinion that the best method is to make a sort of "bluestone brine" in a cask and steep the grain in this for five minutes, then take it out and dry it with lime. Some farmers use too much bluestone, with the result that the grain is destroyed before it is sown. The next danger arises from a too rank growth of the young plants. In such cases get a mob of sheep, turn them into the field, and let them eat the crop down quickly and evenly. Red rust is the greatest danger, however, and for this no cure has yet been found. The only way to escape this scourge is by judicious selection of seed. Sow only those varieties which possess good rust-resisting qualities. Included in these are Budd's Early, Belatourka, Allora Spring, and other hardy varieties. Two years ago I planted a small parcel of Budd's Early. It did well and proved to be a good

wheat. The next season I planted one bag of seed, and gathered from it 22 bags of grain. I can say from personal knowledge that it will withstand more hardships than any other variety known to me. The first season was wet, but the Budd's Early resisted the moisture without sprouting, whereas nearly everyone of the other sorts were growing in the stooks. The next season Budd's Early resisted the rust, whereas most of the other sorts were more or less sriously affected by the scourge. Among the vegetable pests with which wheatgrowers on the Downs have to contend are a plant called by farmers yellow-blossomed clover and a weed locally known as China burr. These "scent" or perfume the grain, and grain so affected gives a twang to the flour, rendering it unfit for market. Consequently millers will not touch "scented" grain, and it is necessary to adopt means to rid the wheatfields of these weeds. The Queensland wheat crop in 1896 totalled 605,000 bushels, and in 1897 well on to 850,000 bushels were grown. This year the total is likely, for the first time, to be carried over the million-bushel line. The average yield in Queensland is much higher than in any of the other colonies. The future of the industry is encouraging. In this connection a word of recognition is due to the Department of Agriculture for efforts made in the past—which it is hoped will be continued in the future—to find varieties possessing rust-resisting qualities and otherwise adapted to our soils and climate. There is one variety of wheat that I hope will be a leading line in all wheatgrowing on the Downs. That is Budd's Early. I believe it will be one of the best wheats we have got. I will now give you an estimate of the cost of wheatgrowing :—

Estimate of Growing an Acre of Wheat.

Dr.							£	s.	d.
Rent per acre	...	...	...	...	...	...	0	10	0
First ploughing	..	...	...	...	...	...	0	4	0
Second ploughing	...	..	...	...	...	...	0	3	0
First harrowing	...	...	...	...	...	...	0	0	9
Drilling	...	...	...	...	...	...	0	1	0
Second harrowing	...	...	...	...	...	...	0	0	9
Rolling	...	...	...	...	...	...	0	0	9
Reaping and binding	...	...	...	...	...	...	0	8	0
Stooking	...	...	...	...	...	...	0	1	0
Stacking	...	...	...	...	...	...	0	3	0
Threshing	...	...	...	...	...	...	0	5	6
Carting to market	...	...	...	...	...	...	0	1	8
Bags	...	...	...	...	...	...	0	2	6
Seed	...	...	...	...	...	...	0	4	0
Balance	...	...	...	...	...	...	2	4	1
							£4 10 0		
Cr.									
Value of wheat—20 bushels, at 4s. per bushel	...					...	4	0	0
Value of straw	...	...	...	...	...	...	0	5	0
Value of chickwheat	...	...	...	...	...	...	0	5	0
							£4 10 0		

—(Applause.)

COW PEA, THE COMING CROP FOR CENTRAL QUEENSLAND.

[By E. ADAMS, Rockhampton.]

As I do not wish to take up too much of the time of this Conference with my paper, and as there has been a large number of essays on this subject from different pens, I intend to place my ideas on the matter before you as briefly as possible. Dealing with the name first, I consider it is its most objectionable feature. I should be very pleased to see a more sensible name adopted. Though it is said there is nothing in a name, I am sure that if a rose were called spinach or artichoke, none of our daughters would be called after it. As to the manurial value of cow pea, Mr. Brünnich at the last Conference estimated its value at £5 per acre. He may be right speaking as a chemist; but I should like to know the crop to grow by which I could make the price of the labour I put on plus the £5 manurial value. But I can say from experience that the crops planted after cow pea thrive better than when the land has been left fallow. I do not wish to say much about its value as a manure, as its value for that purpose is everywhere acknowledged. It is its value as a fodder plant for the Central Division of Queensland that I particularly wish to place before you. We have to grow the pea before we can make fodder of it; and as I have had several years' experience in growing it, I will give you my methods. In the first place

the cow pea does best on fairly light, well-drained soil, though, if you have not this description, grow it on any soil you have except swamp. Plough 6 inches at the least, and, if the land is clean, sow about 60 lb. of seed to the acre. Harrow well and roll. If the soil is likely to be weedy, harrow, sow, and, if there is sufficient moisture in the ground, plough the seed in to a depth of 3 inches. By doing so the peas will be up in four or five days, and get a good start of the weeds. The calendar advises planting every month in the year; but the time for planting in this district should be the end of December and early in January. My reasons for planting at this time are that if you plant earlier the crop generally suffers for want of rain, grows straggly, and does not mature regularly; and though it will live and keep green in the driest of times, it will make very little growth until the January rains, with the result that it is ready for cutting in February—our wettest time—and the seed (being very sensitive to moisture) goes mouldy in the husk, and the crop is only good for manure. If planted later there is generally too much wet (except on very light soil) and the young roots rot, and there is nothing but feeble and sickly plants. If much later, the weather gets too cool for it to thrive, as it loves heat and moisture. Well, say the crop is planted in the first week in January. All things being favourable, in the first week of April the crop should stand 2 feet 6 inches to 3 feet high, and the surface should be one mass of brown seed pods. It is then ready for cutting. I have tried cutting with a machine, but owing to so much moisture in the stems the machine clogged, so that I could not use it. So I have always had to use scythes. A man can mow an ordinary crop at the rate of an acre a day; but sometimes on good soil the crop gets very much entangled. Then I have found the best way is to have a lad with a sickle marking off the swarths. The crop when mown should not be touched until the third or fourth morning. Then start early while it is damp, go along the swarths with the fork and put it together—a good forkful in a heap—leave until the fifth or sixth day; and, if the weather has been favourable, it is then ready to cart to the stack. With a little care in putting the heaps together, the field after carting should be perfectly clean except for a certain number of pods that always fall off. If seed be an object, these could be easily picked up by children. Horses and cows will very soon pick them up; but I always put a lot of pigs on to glean. The ground is now clean. The heavy rains have not washed the nitrogen and ammonia from the soil; but the cow pea has actually added to the soil a certain amount of nitrogen—our most valuable plant food. Its dense foliage has acted as a mulch, kept weeds from growing, and, with the large amount of soft roots, has left the soil in such a mellow and friable condition that when the cultivator has been over it, the land is ready for wheat, oats, barley, or any crop you choose to put in. In our Western wheat-growing areas the cow pea should be a valuable crop to plant after the wheat is harvested and feed it off with sheep, and there will be fat sheep for market, and clean, rich, ground ready for the next wheat crop. According to Professor Shelton's tables of food values, the cow pea is the most perfect natural food, and I can say from experience and the testimony of my neighbours that chaffed it is the best milk-producer we have. I fed my horses on it all last winter. They did their work well, were fat and sleek, and looked as well or better than those that were cornfed. Our fowls we feed on the seed, and they lay well. We feed them to our pigs. Boiled, they are a good vegetable, and the young green pods are equal to the snake bean. I do not think there is another plant grown which is so generally valuable to a farmer. In saving the seed I should think a good threshing machine would be the best when grown on a large scale. Where the pods are hand-picked, if they are laid in the sun for a few days a great many of them open, and they are then easily threshed by hand. I have a set of riddles under my chaff-cutter—a small size to let the dust, fine chaff, and broken seed through, and a larger one above it to throw off the coarser part of the chaff, but let the seed through. By this means I was able to save about 20 bushels of clean saleable seed per acre. Of course I lost a good deal of seed in the chaff. I see Mr. H. A. Tardent, writing on this subject in the *Queensland Agricultural Journal*, speaks of 8 lb. of seed as sufficient for an acre. With such a small quantity of seed it will run all over the ground like sweet potato vines; but if planted thickly, every plant will stand erect, except on very rich land, and I do not advise growing the pea on very rich soil. There is a large demand for seed for the sugar plantations if it could be sold at a cheap rate. I do not know what price they would give. Perhaps some of their representatives present can inform us. I know they will not give 4d. per lb. I think it would pay very well at 2d. or 3d. Like every useful plant, the cow pea has its enemies. The first I noticed was some minute insect that eats part of the outside of the leaves, leaving a skeleton leaf. I do not think it does the plant much harm. The next and worst is a large insect that bores and deposits its eggs in the young pods, which eggs hatch into worms and destroy the pod. They were very numerous this year. Then when the seed was nearly ripe the

cockatoos took a decided fancy to them, and then the crows. Mr. Tardent said in his paper we might expect the bean rust in course of time. This year the late-planted lots on low wet land were eaten up by rust. I daresay the Government Entomologist will have received information from the experimental farms about these pests, and in course of time will give us their life history, names, and best way of destroying them. The seed is not so much subject to weevil as maize. I have some here that has been lying about in bags for twelve months past, and there were fair samples of the hay, chaff, and seed at the show. In conclusion, I may say that the advantages of growing the cow pea are that it is a summer crop; a sort of a catch crop that grows quickly; that it is off the ground in plenty of time for the general crops to be sown; it enriches instead of impoverishing the soil; it leaves the ground in better order than if it had been lying idle; is easily grown and saved; and is one of the most valuable all-round crops that a farmer could produce for his own use. And there is no doubt that when it is better known it will command a ready sale. (Applause.)

Mr. A. H. BENSON, in reply to questions from Messrs. Deacon and Twine, said that, unlike Mr. Adams, he had planted the cow-pea at Westbrook in drills 3 feet apart, putting in single seeds 18 inches apart in the drill. By doing this from 8 lb. to 10 lb. of seed was sufficient to plant an acre. Later in the season he had again planted cow-pea at Westbrook, but this time more simply. After the wheat had been taken off it, a three-furrow plough was run over the ground, and every third furrow a boy walked along and dropped seeds from 1 foot to 18 inches apart. Nothing was done to the land after that, and he anticipated getting about 15 bushels of seed per acre from the crop so planted. When he planted the cow-pea in drills he found the mowing machine would not cut it. The best thing to harvest the cow-pea with was a sharp hoe, which was really quicker than a sickle or a scythe. A man with a hoe, by turning over the vines and chipping them off at the root, could cut over an acre a day of cow-pea, if he was a good hand at it. At Westbrook and Hermitage, where the seed had been planted in drills, the vines had made such a dense mass of growth, and had so intertwined themselves together, that no scythe or sickle could cut them. Where thick planting, however, was followed, the use of these tools was to a certain extent permitted. Ordinary ploughing would do for the cow-pea in dry land, and in the Maranoa district, which should be well suited for the cow-pea, ploughing from 6 to 7 inches deep should suffice. At Westbrook he had had some of the land subsoiled, but that was to get it ready for an orchard. In its green state the cow-pea was not relished by stock of any kind, but when dried it was readily eaten. The Clay Coloured variety, in his experience, was the one most relished by stock.

Mr. W. D. LAMB (Yangan) said he had closely watched the cow-pea at the Hermitage Experiment Farm, and he remembered that, shortly after it sprouted, a tremendous hailstorm came along and left it clean. Most other things would have succumbed and disappeared altogether, but the cow-pea came on again and finally gave an immense crop, which was converted into excellent hay.

Mr. P. McLEAN said that Mr. Adams' statement, that he would not recommend anyone to grow pea on rich land, ought to be qualified. If the crop was grown for manurial purposes, it perhaps held true; but if the cow-pea was grown for fodder or seed, the benefits of good land were quite as evident in the returns as with any other plant. The finest crop of cow-pea he had ever seen was grown on very good land. Judging from the inquiries he was always receiving, there was a big demand for cow-pea seed in the colony, and last year he could easily have sold 1,000 bushels, if he had had them.

Mr. ADAMS, in reply to Mr. Bromiley, said the leaves of the cow-pea did break up when chaffed. It made a splendid fodder, however, and the chaff never affected the lungs of horses taking it. Last year he had got about a ton per acre of chaff, but this year the returns went up from 30 cwt. to 2 tons per acre. He considered the cow-pea quite equal to lucerne for chaff, if not better, owing to the grain that was mixed with it.

Captain A. HENRY (Lucinda Point) stated that for green manuring the Mauritius Bean was taking the place of the cow-pea in many districts in the North. At Macknade he had seen it yield as much as 14 tons to the acre. This bean was useless as a fodder, however, and in fact he believed it was poisonous for horses and cattle.

Mr. W. R. TWINE (Wallumbilla) said the late Mr. Joseph Fleming was the first man to erect a flour-mill in Queensland. It was put up at Ipswich, on the Bremer River.

Mr. E. SWAYNE (Mackay) had sown half-a-ton of cow-pea seed last year, and had planted at the rate of 80 lb. to the acre, and a neighbour of his had used 60 lb. per acre. The object of both was largely to keep the weeds down, and in this the heavy sowings had been successful. Cow-peas certainly smothered weeds, and he might mention that last year there were 2 acres on his cultivation which he did not plant with cow-pea. These 2 acres were now a mass of couch, but the land that had been planted to cow-pea was free from weeds of any description. In Mackay they had tried a South Sea Island bean for smothering nut-grass, but so far without any definite results.

Mr. T. E. COULSON (Rosewood) asked if it would be an advantage to turn milking cows in to cow-pea when it was half grown, and whether, if it was eaten down when half grown, would it shoot up again?

Mr. ADAMS, in reply, said cows did not take to it readily. It would grow again if eaten down, but the second growth was not very good.

Mr. JOS. HUDSON (Rosewood) asked whether it could not be cut down when approaching the ripening stage?

Mr. ADAMS replied that if the cutting was left too near the maturing stage, the vines would shed all their leaves.

Mr. HUDSON said he could understand green cow-peas jamming up a harvesting machine. Green lucerne would do the same.

Mr. WHITELEY (Rockhampton) said that both Mr. Lamb and Mr. Hagenbach, in making out their estimates of the profits of maize and wheat, had allowed nothing for wet weather, and that was a serious omission, as in the harvesting operations dry weather was wanted. As for the question of rust in wheat, growers in Central Queensland would start with thirty years' more experience to work on than the farmers on the Darling Downs had started with. He would like to know whether Budd's Early was a good milling wheat; his reason for asking being that the representative of the milling company, which intended starting in Rockhampton, who saw a sample of the Budd's Early that had been sent up to the district, had declared it was not a good milling wheat. Of course he (Mr. Whiteley) knew that the statements of such gentlemen were to be received with a good deal of caution, as they had their own objects in view. Mr. Hagenbach had given them an estimate of the profits of wheat at present prices, but if he had made his estimates on the prices a few years ago the profits might have been on the other side, and he would therefore like to know whether present prices were average prices. There was not the slightest doubt that cow-pea was one of the most valuable crops that could be grown in the Central district. With the greatest care it was impossible to get all the seed out of it, and the result was that stock fed on cow-pea chaff, mixed as it was with seed, did as well on it as stock fed on oaten chaff mixed with maize. He believed the whole of the cow-pea that was now being grown in the Central district was the result of seed that was distributed in small packets by the Agricultural Department three or four years ago.

Mr. MARKS (Kolan) asked what difference there was in the several varieties of cow-peas?

Mr. ADAMS said, of the three varieties he had any experience of, the Clay Coloured and the Whip-poor-Will were the best. Personally, he found the Clay Coloured the most suitable for his requirements, as it had a more erect growth. In the matter of rich land for cow-pea, he stated that on such soil the plant lay on the ground, which rendered it extremely difficult to deal with.

Mr. P. McLEAN said that probably for Queensland the Clay Coloured was the best of the large varieties of cow-peas. The Black Eye was about the most inferior of the kinds yet tried in the colony. In connection with the milling qualities of Budd's Early wheat, he desired to sound a note of warning, and intending wheatgrowers should be very careful in accepting statements from millers. He had attended four or five intercolonial conferences on the rust in wheat question, and the conferences had always been faced with the difficulty that they had to contend against the millers. As an instance of this he mentioned that some years ago the Agricultural Department saw that the introduction and testing of new varieties of wheat were necessary, and it accordingly obtained a number from Paris, amongst which was the Belatourka. Of course they were aware that wheats, like most other organic things, were liable to become constitutionally weak, and subject to any disease that might be in proximity to them, and that was the reason for the necessity of occasional changes of seed. However, the Belatourka was tried, yielded excellently, and gave satisfaction to growers. It was then submitted to millers, who pronounced it a first-class milling wheat. On such recommendations many farmers went in for Belatourka, but on sending their crop to market the millers refused to accept it as a good milling wheat, and would only give a reduced price for it. This last year, however, another change had appeared, and millers are now advising farmers to grow Belatourka. He might mention that the introduction into Queensland of Budd's Early was one of the outcomes of the rust in wheat conferences. At the conferences, reliable information was supplied relative to the different varieties growing in each colony, and he had, as a result, imported among others the Budd's Early from South Australia. This wheat was now one of the most promising varieties in cultivation in Queensland.

Mr. J. GILMORE (Allora) was one of the first that got Budd's Early from the Agricultural Department. It had done very well, and this year he could have sold plenty of it, if he had had it to spare. Coming down in the train, a miller, Mr. Archibald, had inquired very earnestly about it, as he desired to secure fifteen bags. At the recent land sales on the Darling Downs he was told by a number of South Australian farmers that Budd's Early and three of Marshall's wheats were the main varieties grown in South Australia. In Queensland last year, neither Budd's Early nor the Marshall wheats were in any way affected by rust. Budd's Early was a variety which stood up and grew well in dry weather; and as for millers' objections to it or any other sort, they were, often as not, simply excuses for other motives.

Mr. F. W. PEEK (Loganholme) said the cow-pea appeared to be a general purpose crop, and in the course of his remarks Mr. Swayne had said that about Mackay it was used for green manuring and for smothering weeds. As the Logan district was now suffering from nut-grass, he would like to know if any gentleman present had ever tried the cow-pea for that pest.

Mr. P. McLEAN thought it stood to reason that one crop of cow-pea would not destroy the nut-grass, as the nuts were too far down, but if the cow-pea was kept on the land for any length of time perhaps it might then be effective in destroying the nut-grass. There were two kinds of nut-grass, one with the nuts on the surface, but in the other they were deep down in the soil, and in his own garden he had covered some of the latter with zinc. After he had kept the zinc on it for a couple of years, he would be able to tell them its effect.

Mr. W. D. LAMB (Yangan) said he would like to hear Mr. Benson give his views on the wheatgrowing question. As for Budd's Early, he could say that it was the coming wheat, and the Belatourka, too, was again coming into favour. The millers now had no objection to this latter variety, and would buy it in any quantity. The demand for seed of both these wheats this year was very pronounced. He might say that the Warwick Farmers' Mill had bought Belatourka all along, and it had made good flour. He remembered seeing some Belatourka flour in a mill which had been returned, and the

millers swore he would never buy any more Belatourka. With proper machinery, however, there was no difficulty in making good flour from Belatourka or any other hard wheat; and as a matter of fact in the Warwick mill they had had to get extra machinery for such varieties.

Mr. S. STEPHENS (Nerang) had noticed that in the three papers read nothing had been said about wet weather. All the maize, wheat, and cow-pea referred to had been grown in dry districts, but he did not think husking, threshing, and bagging machinery could be used down about the coastal districts. There was too much inferior maize, for one thing, mixed with the good maize. He would like to ask Mr. Benson if wheat could be grown profitably on the coastal districts.

Mr. A. H. BENSON said that in a district where the humidity was excessive, as was the case in the coastal districts of Queensland, wheatgrowing would never be successful, owing to the rust, if to nothing else. Anywhere in the coastal country, the heat and moisture were too great, except for one or two varieties which were unsuitable for milling purposes, to permit of the successful growth of wheat. Wheat in Queensland would, therefore, be confined to the districts adapted to it, such as the Darling Downs, the Maranoa, and the Central Western districts. With regard to Mr. Lamb's question, he would state that at the Department's experiment farms they were going to carry out very exhaustive experiments in the growth of wheats. Not only that, they were going to breed wheats, strong wheats, resisters of rust, wheats that would stand up well, wheats that would not shell, and wheats with good milling qualities. They would breed the wheats as a man breeds his stock, by the laws of natural selection. Seed would be selected, cultivated carefully, and only the finest plants reproduced. The seed would be kept as pure as possible, and he hoped that with this seed they would be able to keep up the quality of the wheat in the colony, and be able to supply farmers with seed of wheat suitable for Queensland market conditions. As to quality in wheat, millers' fancies changed from season to season, as the law of supply and demand necessitated; but if growers kept up wheats rich in gluten, wheats that would make a sweet loaf of bread, and one that would keep, millers would always buy them. He hoped to be able to raise wheats in Queensland which would produce flour able to hold its own in any market in the world.

Mr. W. D. LAMB (Yangan) had been rather disappointed there had not been more discussion on his own and Mr. Hagenbach's paper, but as wheat had already been dealt with at the Conference, and as maize was such an old subject in Queensland, perhaps there was not much fresh that could be said about either. As for the cow-pea, he did not think, unless there was some better and cheaper way of harvesting it, that it would ever become a leading crop on the Darling Downs. The men on the Downs liked to be sitting down at their work. They sat on the mower, the reaper, the thrasher, and everything else, so that if the cow-pea necessitated the use of the hoe or scythe he did not think they would very eagerly take it up. Doubtless, however, when the cow-pea came into more general use a machine would be found for dealing with it. As for the seed of the cow-pea, he thought an ordinary wheat-thresher would be able to harvest it.

Mr. P. HAGENBACH (Warwick) said he would apologise for his error about the first flour-mill in Queensland. To-day was the first time he had heard about the mill at Ipswich which had been mentioned. He had never heard of it before, and in any event it must have been a very poor affair. With regard to his estimate, he had simply given the returns from an acre of wheat reaped, and he did not think he was very far out. Taking things all round, he had given an average yield. The Darling Downs had made considerable strides in the wheat industry, and if any gentleman present, who could spare the time, would pay a visit to the Downs, particularly about Warwick, during harvest time, he would see the proof of this assertion. As for Budd's Early wheat, at the last Warwick show, Mr. Hayes, of the Queensland Milling Company, had inquired about this variety, and recommended farmers to grow it. It was not

a hard, flinty variety, and personally he (Mr. Hagenbach) considered it a good milling wheat. The wheat that was largely wanted on the Downs was one that would resist the weather as much as possible, and Budd's Early filled the bill in this respect.

Mr. E. ADAMS (Rockhampton) considered the special value of a crop of cow-pea would more than compensate for the trouble and labour involved in harvesting it. Besides, there were a class of men now growing up in the colony who would not be so afraid of work as their fathers. With regard to the price of seed, he thought he would have got some little information from farmers as to what they would be willing to give.

Mr. CHATAWAY said that Mr. Lamb had regretted that more discussion had not taken place on the papers on maize and wheat, papers which had shown every mark of thoughtful preparation, but he should have remembered that wheat had had a very good innings the previous day; it having been discussed from the sowing of the seed to the storage of crop. The discussion on cow-pea, he fancied, had opened the eyes of a good many delegates, and had given them a good deal of useful information. With regard to the manurial value of the cow-pea, it had been shown by recent experiments that this was in direct proportion to the depth the roots went down into the soil. As for the price of cow-pea seed, if Mr. Adams' suggestion was followed out and those who grew cow-pea obtained 4d. per lb for seed, probably every farmer in the colony in a very few years would be raising seed. No price like 4d. per lb. would ever be paid over any length of time. A little more than 1d. per lb., or from 5s. to 6s. per bushel, for seed was all that could probably be expected when once the cow-pea was an established crop in the colony.

INVITATION TO DELEGATES.

Mr. CHATAWAY then announced that the ladies in charge of the ball in aid of the Rockhampton Children's Hospital had very kindly and with great forethought invited the delegates to the ball that evening, and for which on behalf of the delegates he had thanked them.

The following three papers were then read :—

SUGAR BOUNTIES.

[By Captain ALFRED HENRY, Victoria, Lucinda Point.]

The question of bounty-fed sugar, which now so greatly exercises the minds of the producers of cane sugar is, unfortunately, but little understood, and its magnitude but ill-appreciated by the general public of Queensland, and this paper is written in the endeavour to place the situation clearly before the latter. I purpose briefly to explain the system, its effect upon British colonial cane-growers and its possible effect on the British consumers, the motive which prompts it, the arguments that have been brought forward by a German critic of the anti-bounty agitators, the remedial measures that have been proposed, the objections which have been raised in this country and in England to such proposed measures, and, finally, to discuss what other measures, less open to objection, yet equally effective, might be adopted. To those already acquainted with the continental bounty system I must apologise for again briefly pointing out that France, Germany, Austria, and Belgium impose an Excise duty on manufactured beet sugar, from which they pay heavy bounties for all such sugar exported, and further protect the manufactured article by a Customs duty equal to about $3\frac{1}{2}$ d. per lb. The Excise duties levied by France, Germany, and Austria amount to £20,000,000, out of which £5,000,000 is returned to the producers in bounties on the 2,000,000 tons exported; and, as I have already mentioned, their sugar is protected by the absolutely prohibitive Customs duty of $3\frac{1}{2}$ d. per lb. The total home consumption of the three countries is 1,470,000 tons, on which the producers practically receive $3\frac{1}{2}$ d. a ton or £47,375,000, which, added to the £5,000,000 given in bounties on exports, amounts to £52,375,000—a gift which German statesmen in the Reichstag do not hesitate to avow is bestowed for the purpose of crushing the British colonial cane industry—and which, deducting the amount paid as Excise duties, gives a gain to the producers, on a production of 3,585,000 tons, of £32,375,000 in excess of the value of the sugar in open market. The

effect of all this is that the continental consumers have to pay nearly three times as much for sugar made in their own countries as it sells for in London; and the Germans are now offering their best refined sugar in Sydney at £12 17s. 6d., or £2 less than what Queenslanders can *make* theirs for.* It must be obvious to anyone who seriously considers these facts and figures that not only is it impossible for us to invade the London market with any possible prospect of success, but we can scarcely hope to hold our own in Australasia; and that means nothing short of the extinction of the cane-sugar industry in the British colonies—an industry which, in Queensland alone, is responsible for the cultivation of 90,000 acres of land, producing £1,000,000 worth of sugar, which employs in mills and plantations 8,000 white men, and indirectly affords employment to some 20,000 others, and whose manufacturing plants have cost upwards of £1,500,000, and is expanding with giant strides. That this danger, which is patent to all engaged in the production of cane sugar, should have so little impressed the public, both in England and Australia, so far as Queensland is concerned, is probably due to the fact that our colony is not, like the West Indies, wholly dependent upon sugar, and that with us the industry is not yet absolutely *in extremis*. It is doubtful, the circumstances of the two colonies differing as they do, whether those engaged in the industry in Queensland would ever allow themselves to be driven to the wall as the West Indians have been. They would probably put up the shutters before all was lost, and seek other occupations—perhaps in other countries; but the industry would be gone for ever, and the colony and the Empire the poorer. There is a certain callousness as to the future of the cane industry—born, perhaps, of a contentment with the present cheapness of beet sugar, but probably also due to the people not understanding that unless the bounty system is checkmated the end of cane-growing is within measurable distance; that once crushed it can never be revived, and that when it is destroyed, British consumers all over the world will be at the mercy of the continentals, whose statesmen openly declare that they look forward to the time when the British markets will be at their command and they will be able to make the English pay dearly for their present advantage. The only champion of the bounty system who has appeared in the Australian Press is one who signs himself in the *Townsville Star* "A German Critic." He sought to shatter the arguments of the anti-bounty party by pointing out that whereas the continental producers pay an Excise duty of £20,000,000 they receive as bounty only £5,000,000. The "German Critic" but half stated his case, for he omitted all mention of the 3½d. import duty, to which I have already referred, which, together with the bounty, gives, after deducting the Excise duty, State aid to the continental producers to the extent of £32,375,000. The "German Critic" also ridicules the idea of there being any intention on the part of the continentals to crush the British colonial canegrowers, but German statesmen in the Reichstag, and writers in the German Press, have repeatedly assured us that that is their express intention—indeed, it is almost impossible to imagine why the continental peoples should for any other reason consent to be taxed to the extent of more than £32,500,000. It cannot be that the £170,000 given by Great Britain to the West Indies is anything but a palliative to stave over bad times until some fixed and effective policy is decided upon by the Imperial Government; and when some definite line of action is taken for the protection of the West Indies against the continental monopolists, Queensland must take care that she shares in its benefits, for, as I have already pointed out, the danger which threatens the industry in the West Indies menaces ours. A countervailing duty is the only practical remedy that has so far been proposed, and it has been objected to in England and in this country on various grounds. Both here and at home the freetrade fanatics have declared it to be opposed to their principles; but Mr. Chamberlain promptly disposed of their objections when he pointed out that the very essence of freetrade is the unhampered exchange of the natural products of different countries, and where their free exchange is interfered with by such circumstances as surround the sugar markets of the world any measure that would place them on an equal footing would be thoroughly consistent with the principles of freetrade. When the question of countervailing duties was first mooted in Queensland, in a paper written by myself for the Gatton Conference, timidity was the order of the day, and the then Minister for Agriculture declared them to be impossible, because of the treaties between Great Britain and Belgium and Germany. A fortnight later these treaties were denounced at the request of Canada. When the Townsville Chamber of Commerce was first approached by the Herbert River Farmers' League, Mr. Allen brushed the matter aside with the remark that it was the duty of the British Govern-

*The writer of this paper doubtless meant to say that the German sugar is offered in Sydney at £2 less than what Queenslanders can *sell* theirs for.—Ed. Q.A.J.

ment to secure the cheapest sugar for British consumers. Such might, perhaps, be the case, if it were not that the present cheapness is only the prelude to high prices when the British colonial industry shall be crushed—as our continental rivals hope it will be, and as it must be unless something is done to restore the equilibrium of the market—but Mr. Chamberlain thinks there is something better than a saving of half-a-farthing a pound on sugar—the saving of British colonial industries to wit. He believes the British public would cheerfully give a little more for its sugar rather than see a British colony go to the wall. Mr. Chamberlain, however, with whom, probably, more than any other, the selection of the method by which to place British colonial sugar on an equal footing with the beet product of Europe rests, sees certain objections to countervailing duties—though he has distinctly said that they present to his mind no insuperable difficulties should all other methods fail. The chief objection the Secretary for the Colonies sees to countervailing duties is the cost and inconvenience of their collection. The sugar imported from the colonies bears a very small proportion to that imported from the continent, and it would, in order to protect the smaller portion, be necessary to weigh, bond, and register the larger. There is another way in which the colonies might be helped just as effectually as by the imposition of an import duty on beet sugar, and with, in the long run, the same result to the British taxpayer, and without greatly injuring British manufacturers. I mean by meeting bounty with bounty. Let Great Britain give its colonies a bounty on their sugar. The weighing and registering could all be done in the colonies at shipment, which would do away with all inconvenience so far as the Home authorities would be concerned. Whether England paid from the Treasury a lump sum upon all colonial sugar imported, or whether the consumers paid a fraction more for the sugar they purchased, the cost to England would be, in the long run, the same. It must also be borne in mind that, whether England gives a bounty or imposes countervailing duties, whatever is done will be for a short time only, for, as the continental bounties are given with a view of crushing the cane industries, as soon as it is made clear there is no longer any hope of doing so they will cease, and the colony will no longer require assistance. Undoubtedly the price of sugar will go up slightly, but it will be better so than to have the market at the mercy of the continental producers when the colonies have planted their last crops. I submit that it behoves those interested in the cane-sugar industry to impress upon British people, here and at home, that the dangers which threaten the West Indies threaten Queensland as well; that whatever remedies are applied in the case of the West Indies must be extended to us if our industry is to survive; and that the only hope consumers have of not some day lying at the mercy of German monopolists is to foster and sustain the British colonial cane industry, bearing especially in mind that whatever sacrifice England may now make it will only last until Continental Governments understand that they can no longer hope to ruin us. Their people will not cheerfully submit to be taxed to the extent of £34,000,000 when they become convinced that there is nothing to be gained by it. If Queensland gets fair play, if she has the opportunity afforded her of, as Mr. Chamberlain puts it, “freely exchanging her natural products for the natural products of other countries,” the limits to the expansion of her sugar industry are impossible of definition. That right of free exchange must be won now, or it will be soon too late. On the sympathy of the Imperial Government we can safely count, but we must bestir ourselves to let it know our needs.

THE BETTER ORGANISATION OF FARMERS AS A MEANS OF REDUCING THE COST OF PRODUCTION.

[By E. SWAYNE, Pioneer River Farmers' Association, Mackay.]

As one of the representatives of the association which, with the view of drawing the agriculturists of Queensland closer together for purposes of mutual benefit, first suggested to your Department the Conference afterwards held at Gatton, I think it is fitting that for the second time I should say a few words on this subject. In these days of close competition, when every nation is striving for first place in the world's markets, one of our first aims, if we are to hold our own in the industrial struggle, must be, in every possible manner, to improve the quality and lessen the first cost of our products. This applies equally to our wheat-growers, who promise soon to produce more than sufficient for our own requirements; to our dairy-men, who have recently exported 300 tons of butter; and to our sugar-growers, who this year will be confronted with the problem of having to find a sale for over £1,000,000

worth of sugar more than we can ourselves consume. If we can do this and have a profit on the transaction, the colony at large benefits. If we cannot, the whole of our population shares in the loss resulting from land going out of cultivation and the consequent decrease in money circulated. To aid us in producing cheaply, various factors, most of which are best obtained by combined action, are necessary. The necessary capital for reproductive work obtainable at a low rate of interest, with its repayment spread over a term of years, is one. As instances where Government assistance in this respect has largely increased areas under cultivation and in other ways improved agricultural operations, I might mention the 1846 Drainage Act of Britain, and our own Sugar Works Guarantee Act, to the last of which we chiefly owe the sudden anticipated increase in our sugar output. Labour is another, and, in tropical agriculture especially, one of the most important requisites to the end we have in view. Our competitors, both in Europe and elsewhere, have it in sufficient quantity, reliable, and at a reasonable rate of wages. If we are to hold our own with them in the open market, we must have the same. In many branches of agriculture there is a very large difference between the price received by the growers and that paid by the consumers, and co-operative efforts to secure to the former part of this margin would enable us to better our position without increasing prices. For this we must organise. As an example of what can be done in this respect, we have Denmark, which, by co-operation, has made herself, as a purely agricultural country, one of the wealthiest in Europe. The improvement in the quality of our articles and the richness of our raw material, such as sugar-cane, are other means towards success, and here State experiment farms are necessary. We have also legislative requirements, to procure which, mutual assistance is desirable, amongst which I might mention Acts dealing with drainage water; affording protection from fraud in the purchase of manures; securing an efficient inspection of all weigh-bridges on which agricultural produce is sold; and securing to the producers check weighmen or agents acting on their behalf a legal standing at stills and factories where their produce is sold; and many other laws connected solely with our calling. Besides, in these days of class legislation, we should be prepared to act unitedly on general questions, for I believe that amongst the greatest misfortunes that can befall us are sudden changes of policy on the part of our rulers. Those branches of our industry supplying local requirements may be crippled by changes in the tariff, &c., while those that may be termed tropical, can be ruined by sudden interference with labour, and so on. I think you will all agree with me that it is desirable that we should ally ourselves for the attainment of these objects; but while it is very easy to say what should be done, it is very often much more difficult to point out how it is to be accomplished. One way might be by means of a central council, meeting regularly, with a paid secretary, whose duty it would be to assist—by collecting information, &c.—farmers in the disposal and distribution of produce to the best advantage. This body, composed, as it would be, of representatives from the various districts, could also deal with the other matters mentioned. But the most effective manner in which our purchasing and marketing requirements could be provided for would probably be by a system of co-operative stores owned by the farmers in their respective districts, purchasing their supplies through one large co-operative establishment such as the Manchester store, in which most of the co-operative stores in the north of England hold shares, and through which their supplies are bought. For distributing our produce the above establishment could be supplemented by opening produce stores in our best local markets, such as the Towers, &c. Of course funds are required to carry out such a scheme, but a few shares held by each farmer would soon furnish a large share capital. An instance of success in such an enterprise may be found in the South Australian Farmers' Co-operative Union. In the commencement of this paper I mentioned what may be termed reliable money for farmers, and spoke of State assistance in the matter. I know this is a question requiring careful consideration, in order to guard against abuse. Nor is it at all desirable that money should be too easily obtained. It should, in any case, be only procurable for strictly reproductive works. When such is the case it is a great incentive to development, and with our Premier's recent utterances on the subject at Warwick fresh in our minds, and your own well-known favourable attitude on the question, Mr. Chairman, I think we have grounds for hoping that something may be done. As a suggestion, I would ask if it were not possible to initiate something similar to the continental land banks, the State giving some assistance at the start. In Germany, although these banks are now able to obtain all the money they require from those of the public having money to invest, the first ones did receive assistance, I understand, from the Crown. In conclusion, I must apologise for this very short and incomplete paper, but might mention as an excuse that I was only appointed by my Association as one of their delegates a day or two before leaving Mackay. (Applause.)

STATE EXPERIMENT FARM FOR SOUTHERN QUEENSLAND.

[By J. E. NOAKES, Maryborough.]

The paper I have the honour to bring before you, though last on the list, is, from my point of view, the most important brought before this Conference—firstly, because the sugar industry is such a large and important one, employing more labour than any other industry in the colony, except gold. Take the estimate for the year—namely, 130,000 tons. That, at £10 per ton, amounts to £1,300,000. Of this at least £1,200,000 will be paid away in labour and machinery. So it is patent to anyone the industry is a large one, and entitled to some consideration. When we consider the extent of our coast line—over 1,000 miles—along which sugar can be grown, this return of 130,000 tons could be brought up to 1,000,000. We have the land to do so, if we can only get the proper varieties of cane to suit the different districts. Twice has the industry been nearly wiped out. The first time was in the seventies, when the Bourbon (which was the favourite cane) took the rust, with the result that nearly every planter and grower was ruined. The second time was about four years ago, when the gumming threatened to end the reign of the Rappoe. Now, under these circumstances, I and other planters think it is the duty of the Government to establish an experiment farm in the Southern districts for the purpose of, either by grafting, seedlings, budding, selections, &c., producing a good strong healthy cane suitable for the Southern districts—one which will stand the frost, rust, &c. Private individuals cannot do this. Life is too short for one man to experiment and bring it to a satisfactory conclusion. Even if he did, he would not be appreciated. I, with others, during the gum scare, began to look out for a cane to replace the Rappoe. I saw in the papers that a cane called the Daniel Dupont was the cane likely to suit. It was grown on the Richmond and Clarence Rivers, and went over 100 tons per acre, was gum proof, and of high density. This we thought was the cane for us. We got some, and it cost us over £30 to get enough to plant one half-acre. It has turned out a failure with us. Then we saw that the White Bamboo was gum proof, of high density, and everything to suit us. We, as usual, got some, planted it on the Mary and Burnett Rivers, also at the Isis and Woongarra. This cane gave good plant crops, but has not turned out a good ratooner, and was equally gummy with the Rappoe, and was also subject to frost. In fact, it has turned out a failure so far. While in Brisbane about the same time—about four years ago—I saw a gentleman from New Guinea. He told me he knew of thirty different sorts growing at his place, some of them 40 feet long. (Loud laughter.) I at once took him to Mr. McLean; and after interviewing him, he gave the names of about twenty different sorts. The Department sent up an agent to obtain some. He, I am led to believe, did not go to the place, but gave some of the natives a fig of tobacco to bring him some canes. These, on arriving at Mackay, were found to have the borer, and were subsequently destroyed. The Department sent up again in conjunction with, I believe, the New South Wales Government, and obtained some sixty different varieties, with what result I cannot say; but I am led to believe that most of them are a failure, I think through want of the proper man—I mean an expert whose time should be devoted to this subject only. While on the Richmond last year I visited the New South Wales experiment farm, and found that they had over sixty different kinds—all properly named and date of planting affixed—out of which I chose about twenty, and they are now growing at the Woongarra. These are my reasons for stating that we should have a Government experiment farm in the Isis district, because it would be central and could be seen at any time. The beet has been improved, say from 8 to 10 per cent., by experiments. Why should not sugar-cane be also improved? It is the opinion of planters that it can be done, and that the Government should take the matter in hand. (Applause.)

DISCUSSION.

Mr. E. DENMAN (Mackay), in order that some of the gentlemen present might thoroughly understand the position of the cane-sugar industry in relation to the continental bounty system, read the following extracts from the report of an interview between a representative of the *Financial News* and Mr. Quintin Hogg, a gentleman largely interested in sugar in British Guiana. It would help to show them the position in which the sugar planters in those countries were placed, and that their troubles were not due to antiquated machinery or methods, as had been alleged by some, but to what was distinctly unfair trade. The extracts in question ran:—

Mr. Quintin Hogg summed the whole difficulty up in the word “bounties.”

“The effect upon the West Indies is that we are driven out of the market. America is now almost our last hope, and every little rise in price brings European sugar across, owing to the low freight rates. In addition, we have to fight the bounty-

protected Californian beet sugar industry and the Louisiana growers. If further steps are taken to protect America from the European growers, as is threatened, we are driven out of that market too. And, as it is, the export of beet sugar from Europe is showing signs of being increased in the near future."

"You, of course, consider it absolutely necessary that the bounty system should be abolished?"

"Undoubtedly. It would have been settled in 1888 but for the action of France. It was regarded as a necessity by the representatives of the different countries that all must abolish their bounty system. England provided the market, and if any country went back upon its word, a countervailing duty was considered necessary. We did not see our way to adopt this course; and, in fact, all along, France was working against the understanding."

"And the bounty system shows no signs of diminishing?" our representative queried.

"Does it look like it?" was the reply. "Until this year the bounty was, roughly, 15s. per ton in Germany. In France it was double. Now the German bounty has been doubled, and France is thinking of following suit."

"Put it in this way," continued Mr. Hogg. "We are prevented by the laws of foreign countries from obtaining a living. Supposing a couple of foreign gunboats were sent to Demerara, and sugar was not allowed to leave without a payment of nearly £2 per ton. There would be war. Yet we allow foreign countries to damage our industries to exactly the same extent by aggressive action in the commercial world, and say nothing. The position is illogical. In fact, whenever the question is mooted, there is an outcry that freetrade is in danger, although the present system is dead against the views of Cobden, whose notion was to produce at the natural price after a natural manner. Artificial sources of production cannot result in permanent cheapness. It is openly avowed that when our producing colonies are ruined, the price of sugar will be raised and the bounties removed."

"Then you maintain that it is necessary to impose a countervailing duty?" was the next question asked.

"Certainly. The objection is that the price of sugar will be raised. But one knows that it will happen sooner or later. Let me put a question to any opponent of our views. What is the difference between abolishing bounties by treaty and imposing countervailing duties? The effect is precisely the same. If it is right to do one thing, it is right to do the other."

"But the immediate result, that is so much objected to, is that the working man will suffer by paying higher prices, should your countervailing duties be imposed."

"By how much?" was the rejoinder. "I said just now that an artificial source of production is not really in favour of cheapness. But even should the countervailing duty of 25s. per ton be imposed, the result would be less than $\frac{1}{4}$ d. per lb. rise in sugar. The Cobden Club has, in fact, estimated it at half-a-farthing. And by putting on the countervailing duty until the bounties are removed, the sum of about £3,000,000 per annum is raised for the relief of the British taxpayers. It is necessary to continually bear one fact in mind—the countervailing duty is merely a temporary measure, used to force the hand of foreign Governments and bring about freetrade."

"Do you think any portion of the depression is due to antiquated methods, bad machinery, or anything of that kind?" our representative asked.

Mr. Hogg laughed. "No country in the world is better fitted than Demerara in the way of sugar machinery," he stated. "I have put in £250,000 in the last ten years on the estates in which I am interested. Another firm has, I know, put in a similar amount in Demerara. No country is ahead of us in this matter. Individual estates in Cuba are, perhaps, better; but even the Cuban average is not so good as that of our West Indian plantations. It is the same with the officials employed. I myself paid a French chemist £2,000 a year for some years to remain on the estates and merely try to effect improvements in the method of working."

"Then there is the absentee question," was the next attempt to draw Mr. Quintin Hogg's views.

"What do you think the complaint of the French colonies is?" said Mr. Hogg, with a laugh. "They grumble because they have no monied absentee proprietors. Of course, I do not think absenteeism is a good thing, but in the West Indies it is at the best. Large estates owned and worked by big capitalists do not lead to much harm in the long run, and it is precisely because they have not got them that the French colonists complain."

"What about the cost of production as compared with France and Germany?" Mr. Hogg was next asked.

"We can produce more cheaply than either; but for all that, sugar plantations are going out of cultivation. I was forced to abandon one recently, on which a quarter of a million had been spent. This was partly due, I admit, to the Atlantic wash on

its seaboard, but the main cause was the bad outlook and ruinous competition. That estate alone turned out 6,000 tons of sugar. You see it is the terrible uncertainty that causes us to abandon the estates. We could never have kept going so long had it not been that the plantations have, as a rule, been worked by big capitalists. Even if we could compete with a 30s. or a £3 bounty to-day, we always have to fear a £6 bounty to-morrow, for, roughly speaking, France has had a bounty of that extent before. It is the uncertainty that kills. So far, we have been hoping against hope. In the old slavery question there was a given quantity with which to fight. In this question there is none; you cannot ascertain the cost of sugar when it depends on the whims of foreign Governments. Business men will readily acquiesce when I say that there is nothing worse than uncertainty of this kind.

"The foreign producers are often selling below actual cost, I suppose?"

"I will give you an illustration of that. I went to see the French chemist concerning whom I spoke to you just now, after he had returned home and started a beet-sugar factory. He was showing me round, and I put the question to him of the cost of his sugar on the factory floor. The answer I got was that the cost to him was nearly £14 per ton. He was selling it at rather more than £12 per ton, and making about £2 profit. There is the beauty of the bounty system."

"Your opponents consider that the West Indies might produce other things than sugar more profitably," was our representative's next remark.

"Well, I have grown sugar and several other things in various parts of the world," was the reply, "and I do not see what could be done. You must consider each place by itself. Barbados, for instance, is singularly adapted for sugar. Under normal freetrade conditions, it is by far the best sugar island in the world. A very fertile soil and excellent natural drainage combine in its favour. I do not know what else they could grow more profitably than sugar. Then, take the case of Demerara. The coast lands are good for little else than sugar. The cost of working and artificial drainage will act against the small plantation. Up river, a little coffee can be produced, a little cocoa, perhaps, and some cotton. But—who would do it? Look at the enormous amount of capital that will be lost if the sugar fails. Who is going to make any further effort?"

"But when the Ceylon coffee-planters failed they took to tea, and made big profits. Surely you could change from sugar to something else?"

"Yes. But it is necessary to bear in mind that it costs little to change from coffee to tea. There were not big amounts of capital to be abandoned. You talk of energy. The Ceylon planters never showed anything like the energy of the West Indians. We used to grow sugar at £23 to £24 a ton. We have fought all the way down to £10, and we have done it by improved methods and so forth. We have not stood still, I can assure you."

"How about Indiarubber as an alternative product?"

"Well, we tried it in Ceylon, and it was a great failure. It is a difficult tree to grow, and takes some time to establish. The planters will not throw money away in wild speculation of this kind. You might as well talk of establishing oak forests in England to start a new industry with. Tea gave profits in three years to the Ceylon planters. Indiarubber would take many years before success was assured."

"Then there is the appeal for justice," Mr. Hogg continued. "We are surely entitled to access to our own markets on reasonable terms. Here we are practically shut out of our own markets by foreigners, and our countrymen merely look on and smile while a big industry and important colonial possessions are ruined. I am a firm believer in the British elector, if the facts could only be placed before him. I have addressed several audiences of working men in the North, at Hull, and other places. I have always found them open to reasonable consideration of the difficulty. For it is a question that very considerably affects their interests. All the machinery in use is British machinery, we burn British coal, the stores are British, and we employ British men in the official capacities. It will be a big matter for English working men if the sugar industry is doomed to failure. The loss, too, of 280,000 tons of sugar that is at present carried in British ships is no unimportant detail."

"You do not attach much importance, then, to the ruin of British industries by the rise in the price of sugar?"

"I suppose you refer to Lord Farrer's notion that the jam and biscuit industries will be injured. That is absurd. In England a jam-maker pays considerably less than the Continental maker for his sugar. In the cheapest Continental country he pays £9 per ton more. In France he pays £25 per ton more, this being due to the duty imposed in the country in order to produce the bounty. The English manufacturer has £10 to £25 the advantage of the position; and to think that he will be ruined because sugar is raised £1 or so a ton is ridiculous."

Mr. DENMAN then went on to say that it had been urged that the action advocated by canegrowers would be an interference with the domestic policy of the old country, but as long as they were an integral part of that country they had a right to discuss its policy. A parent might excuse himself for not interfering when he saw his child being throttled, on the grounds that by interfering he would suffer himself. But was that natural? So far the cane-growing districts have felt this severely. Each year the price of sugar was fixed by the price of beet and by the price of sugar in Java, which colony had an advantage over Queensland in the shape of a cheap and ample labour supply. The question was not new, and had been brought up at the Gatton Conference last year. A resolution was drafted and submitted to the Conference, but the chairman, the Hon. A. J. Thynne, had pointed out that at that time a commission was sitting on the matter in England, and that it would be well not to take any action until its decisions had been made public. Mr. Thynne had also stated that there would in all probability be another Conference this year, and suggested that they then again bring the matter forward. This had been done, and the sugar representatives present trusted to receive the support of the whole Conference in the matter, as it was one which affected the whole colony. A resolution would be submitted asking the Queensland Government to use its influence with the Imperial authorities to get them to impose countervailing duties on imported bounty-fed sugar or some other remedial measure. He noticed that the English Government were granting a sum to the West Indies, but he did not think that was what the people of those colonies asked for. They did not ask for charity, but only that the mother country should defend them from unfair competition.

Mr. T. A. LINDEMAN (Bundaberg) thought the subject-matter of the three papers that had been read should have the approval of every sugar-grower in the colony, and he hoped the sugar representatives present would not be tedious to the other delegates, inasmuch as he had seen originally maize-producing localities now sugar-producing country which purchased large quantities of maize from the South. Cow-pea was now being used for the purpose of green-soiling, and he knew of no better system of returning to the soil what the sugar-cane had taken out. It took time, perhaps, and its action was not so direct as chemical manures, but the gain was very great. In all probability there would be an output this year from New South Wales, Queensland, and Fiji of some 220,000 tons of sugar, against a consumption in the Australasian colonies of about 180,000 tons. This estimate would probably be realised, and as soon as production overtook consumption they would have to face open competition in the London market against bounty-fed sugar, which, but for the bounty, would be sold at a loss to the manufacturer. Where canegrowers were suppliers to a central mill, they were directly interested in the bounty system, but even those growing cane for private mills should also do what they could to remedy its abuses. If the manufacturer could not sell his sugar at a profit, he was not likely to continue working long at a loss. Sooner than that he would close his mill, but if, by some action of theirs, they could assist him to run his works at a profit, the supplier of cane would also benefit. He (Mr. Lindeman) was strongly in favour of the further organisation of all the agricultural societies throughout the colony. It was only by the South helping the North, and the North the South, that they could bring about that state of affairs which all felt was so desirable.

Mr. T. WHITELEY (Rockhampton) congratulated Captain Henry on the able manner he had brought the bounty question before them. His own association had discussed this matter on a circular-letter that had been received from the Herbert River Farmers' League, and he might say that his association were quite willing to do all that they could in the matter. It was a very serious one, one that not only affected the British consumer, but their own local markets also. If the bounty-fed sugar could be placed on their own markets cheaper than they themselves could produce it, there was nothing to prevent the beet product coming into competition with that of the cane at their

own doors. The whole bounty system appeared to be a very unjust form of competition altogether, but, as Mr. Lindeman had said, with co-operation amongst the agricultural societies throughout the length and breadth of the colonies, a good many difficulties of this kind, not only in sugar or in wheat, but in fruit and every other branch of the farming industry, could be fought and dealt with. He had trusted something in this direction would have been done at the present Conference, and that meetings, apart from the regular business, would have been held to see if certain lines of action could not have been determined. He was afraid, however, that time was now too short to allow of it being done, but in the meantime he hoped all the societies there represented would heartily take up the matter brought forward by the sugar delegates and render them every assistance possible.

Mr. E. BYTHEWAY (Gympie), while complimenting Captain Henry and his supporters on the way they had brought the bounty question forward, still thought they had treated it from rather a one-sided point of view. It was all right to ask the British Government to place a countervailing duty on bounty-fed sugar, but there were other points to be considered. A considerable business had been built up in England in the manufacture of confectionery, sweetmeats, jams, lollies, &c. Continental sugar was sent over to England at cheap rates, and returned in a manufactured state to both Germany and France, and in his opinion he thought it would be a most unfair thing to ask the British Government to place countervailing duties on continental sugar unless this colony was prepared to say that it would be willing to allow British manufactures into Queensland at a lower rate than the continental. It was scarcely right to ask for a concession unless they were prepared to give one in return.

Mr. WM. DEACON (Allora) still held the opinion that he held last year, and that was that if there was any system invented down below and matured there, it was the system of sugar bounties. It was one of the most abominable systems in the world, and as an attempt at monopoly, it had been rightly described by Captain Henry. Its originators wanted to crush the cane industry so as to get a monopoly for beet sugar in the markets of the world. It had been said that it was useless approaching England, but the anti-bounty cause was a just one, and any just cause was worth fighting for. Still, he had to confess that he doubted whether much satisfaction could be got from England at the present time. England was now, so he had seen stated, the manufacturer of confectionery for the world, and as they knew, sugar entered very largely into all departments of this industry. There was jam, for instance, once a luxury, but now a common article of food in England. It appeared, however, that this bounty-fed sugar was coming to Australia, and not only was it bounty-fed, but it was coming in bounty-fed ships, and there at any rate they might be able to have influence to have an extra duty imposed on such sugar. With regard to what Mr. Bytheway had said, he instanced the United States, a country which knew how to deal with such questions as they were then discussing. Supposing there were a duty on sugar, and if sugar came from a country that gave a bounty for export, the United States imposed the same bounty as an additional duty to the ordinary impost. In concluding, he (Mr. Deacon) thought if they made some attempt for securing fair play, if they only kept knocking at the door, they would perhaps succeed in the end in getting some concession. The leading men in England wanted to consolidate the colonies, and to build up an Empire, and to do this it would be necessary for them to consider the whole of it. He would suggest that the sugar-growers of Queensland communicate with the other British sugar colonies, say Demerara or Mauritius, and let them all work together. If they did this, they would probably get some redress. At least, he hoped so. Mr. Chamberlain at any rate would support them, if the Liberals would not, or the Tories dared not.

Mr. A. MACFARLANE (Rockhampton) said that personally he would rather pay more for his sugar than see the British sugar colonies ruined by continental monopolists, but he would like to have some information on the magnitude of the confectionery business in England. Would the countervailing duties affect this industry?

Mr. O'KEEFE (Laidley) said that while on the subject of Mr. Swayne's paper he desired to take the opportunity of stating that he had been commissioned by the Lockyer Agricultural and Industrial Society to thank Mr. Swayne for the way he had taken up the subject of co-operation, and to assure him that any effort he might make would have the sympathy and support of the Lockyer society.

Mr. F. W. PEEK (Loganholme) said Germany was bidding not only for control of the sugar industry, but of numerous other manufacturing industries also, and for his part he would certainly give his support to the cause so well advocated by Captain Henry. He, too, had received instructions to thoroughly support Mr. Swayne, not so much in matter of co-operation among associations as in affiliation, between which there was a slight difference. With regard to Mr. Noakes's paper, he stated that some four or five years ago, at the Acclimatisation Society's grounds, he was shown cane seed which had been grown there, and which had been planted out. Several gentlemen in his own district had received cane plants of new varieties from the Kamerunga State Nursery, which showed that the Government had already initiated the principle of experiment farms for sugar-cane.

Captain A. HENRY (Lucinda Point) thanked the delegates for the way they had received his paper, and also the Rockhampton Press for the way in which it had permitted him to champion the cause of the North. With regard to Mr. Bytheway's criticism, he could assure that gentleman that nothing would gratify him (Captain Henry) more than a British Imperial Zollverein, and he hoped he would live to see it. However, he thought Mr. Bytheway was wrong when he said that, unless they were able to offer some compensation to the British public for its assistance to them, it would be ridiculous for them to press for countervailing duties; that until the colonies had given England some compensation for its loss it would be foolish to ask England to endure the loss. Mr. Chamberlain, for one, did not think it would be by any means ridiculous. As for countervailing duties being an infringement of the freetrade principles of England, he had only to say, with Mr. Chamberlain again, that the essence of freetrade was the free interchange of the national products of countries doing commerce with each other. It could at once be seen, however, that if a Government fosters one of its productive industries by huge bounties all freedom of exchange ceases, and Mr. Chamberlain had stated that, in his opinion, the imposition of any duties which would restore the equilibrium and put the products of two countries on an equal footing would be entirely consistent with the principles of freetrade. In his (Mr. Henry's) mind there was no answer to that. As for the confectionery business of Great Britain, it should be remembered, if the sugar-cane industry was destroyed, that there would be no doubt whatever that the continental beet-producing countries would immediately make the British public pay the piper. The continental countries had not been taxing themselves all these years for nothing. They had already spent hundreds of millions in endeavouring to crush out the British-Colonial cane sugar industry, and if they were ultimately successful they would have this money back again. They would make consumers of sugar, the world over, reimburse them for the enormous taxation to which they had submitted in order to crush out the cane industry. That being so, cheap sugar would soon be a thing of the past in England, and that, to his mind, was perfectly evident. The people of Germany had been told over and over again that if they could only win the victory they would reap the reward. If that did not mean that consumers would have to pay through the nose for their sugar, he did not know what it meant. Then came the question whether the imposition of countervailing duties would immediately increase the cost of the manufacture of British confectionery, and he maintained it would not. Sugar was now sold in Germany from 6½d. to 8d. per lb. In England it fetched something like 2d. A farthing per lb. extra would meet the balance of £2 10s. per ton which the continental beet-producing countries pay on the

export of sugar. That being so, sugar in England would be $2\frac{1}{4}$ d. per lb. against $6\frac{3}{4}$ d. to 8d. per lb. in Germany, and he did not see how the Germans and Belgians could possibly compete against England at those prices. It should also be remembered there was a protective duty on sugar in the continental countries, and if the $3\frac{1}{2}$ d. duty was taken off it would only bring the price of continental sugar down to about $4\frac{1}{2}$ d. Even at that rate, how could continental manufacturers possibly compete with England, when the former paid $4\frac{1}{2}$ d. for their sugar, and the latter $2\frac{1}{4}$ d.? The meeting of bounty by bounty, in his opinion, would not affect, in the smallest degree, any of the manufacturing industries of England. Personally, he favoured the idea of meeting bounty by bounty. Mr. Chamberlain had pointed out that countervailing duties would cause an enormous amount of inconvenience, but he had also repeatedly said that although he saw great difficulties and considerable interference to trade in the event of those duties being imposed, yet none of the objections were to his mind vital, and that when "all the resources of civilisation" had been exhausted, when no other means could be found to put an end to this iniquitous system, he would be in favour of the countervailing duties. There was one more thing he (Captain Henry) would like to say. He would like to emphasise the fact that it was their duty to point out to the public, all the world over, that the present advantage it was gaining by the cheapness of sugar was as nothing compared to the future danger consumers ran of having to pay enormously for it if once the cane industry was crushed. The Rockhampton *Bulletin* had said the other day, in reply to a letter of his, that supposing the price of sugar did go up, would not the cane industry, if destroyed, be re-established? He would ask those present, if the £1,500,000 worth of machinery engaged in the sugar industry in Queensland were once abandoned and left to go to ruin for two or three years, whether it was likely, or possible, that anyone would set to work and take the industry up again.

Mr. J. E. NOAKES (Maryborough), after thanking the delegates for the kind way in which they had received his paper, stated that it was about nine years ago when Mr. Soutter got from him the seedling cane he had referred to in his paper. The seed was got from Rappoe cane. As it had taken nine years to get one perfect cane, they could easily understand how the raising of such canes should be the work of a Government Experiment Farm, and not of private individuals. Mr. Noakes also mentioned that he had himself grown sugar-cane 20 feet long, and not one stick only, but several.

Mr. CHATAWAY said it was pretty evident the Conference generally considered the continental sugar bounties iniquitous, but it would be well to remember that practically at that moment the Central Queensland Stockowners' Association were asking for a bonus of £10,000 to encourage the export of chilled meat. Apparently bounties were unfair in one place and quite fair in another; as a matter of fact, Queensland had been giving a bounty on the export of butter to England, and was knocking the English farmer kite-high in the process. That countervailing duties would do away with the continental sugar bounties was believed by a great many people, but he was not going to discuss the matter just then. Mr. Swayne and his friends, however, had shown in a practical manner their faith in that belief, and the Anti-Bounty League in Mackay had forwarded £100 to England in order to show their sincerity in what they were agitating for. Whether they were right or not was a matter which they understood much better than the speaker. Mr. Deacon, who had been a warm friend of the sugar people, desired an extra duty on bounty-fed sugar imported into Australia. Victoria had done it, but he was afraid the other colonies were hopeless cases. He would inform Mr. Peek that the seedling cane he had referred to was now in perfectly safe hands, and was being well looked after.

The Conference then adjourned.

SIXTH SESSION.

FRIDAY AFTERNOON, 13TH MAY, 1898.

Mr. W. R. ROBINSON (Toowoomba) read his paper on—

PIGS AND THEIR MANAGEMENT.

The pork industry in Queensland has made rapid strides during the past four or five years, and if it continues to grow at the same pace we shall very soon have to become exporters, and in this particular line we should be able to compete and hold our own with any of the pork-producing nations of the world. America has long been known as a swine-producing country, and its people claim to produce as well as consume more pork than any other nation. The export of pork in one form and another from that vast country amounts to nearly £20,000,000 annually. Now with our waste products Queensland should make a big bid for part of this business. Our conditions and climate are well adapted for pig-raising on a very large scale. We have no hard winters where snow and ice compel pig-owners to erect expensive and covered-in piggeries to shelter their swine, as many have to do in America. We have soil and farmers equal to those of America, but for some reason we have not taken to the pig in the way we should have done, and had it not been for the few bacon factory owners, the pig industry in Queensland would hardly have been worth speaking of. But now we have more factories going up in various parts of the colony. The business is increasing by leaps and bounds, and the farmers and pig-raisers are going to have a good time of it, as the competition for baconers and porkers will be very keen. But the man who does not devote some care and management to his pigs will be in the background.

Pigs require good and careful attention. The old slip-shod method of pig-keeping has gone by. The bacon-curer requires a better class of animal, and is prepared to pay a better price. Therefore it behoves every man who keeps a pig to keep one of the right sort, and no matter what distinct breed he wishes to keep let it be good of its kind.

The Berkshire is the pig most suited to our climate, and the most popular, true to type, early maturing, up to date pig we have. If carefully reared and kept growing, they should be fit for the bacon-curer at six to seven months old, and should weigh 120 to 140 lb. Every breeder's aim should be to obtain a high-class sire from some well-known reliable breeder of pure pigs, remembering that the sire is half the herd, for if you start with some half-bred brute, you will be years working out the strain. In selecting a boar, always choose a pig with plenty of hair, true markings, gentle disposition, uniform breadth—not only across the shoulders, but across the loins—good full hams, deep sides, and as much length as can possibly be obtained consistent with size. The young boar, if he is perfectly developed, may be used for stud purposes at eight to nine months, and I always believe that better stock are got by relying upon a comparatively young, rather than on an old boar.

The Selection of Sows.—This entirely depends on what you are going to do with your young pigs. If you intend breeding stud pigs, then select sows of the very highest quality, but, as the breeding of stud pigs does not concern the majority, I will treat more on the general purpose or what we may call the commercial sow. That is a good, long, roomy sow, with deep ribs, full hams, an active, vigorous animal, about half or three-quarters bred; a sow that will eat readily, and develop a big supply of milk to suckle her young. Never choose a sow that has less than twelve teats. Mated to the pure-blooded boar, she should throw you not less than ten or twelve pigs at a litter twice a year, and rear them well. This class of sow is far more profitable to the farmer than the pure and highly-bred sow, but if he intends to go largely into pig-raising then it would be advisable to keep two or three pure sows, so as to grade up and breed his own stud boars.

Pigs require plenty of exercise, good, clean, dry, camping quarters, well sheltered from driving rain and cold winds, and plenty of clean water to drink. Don't run away with the idea that when you have thrown your pigs in a lot of slop that it serves for a drink. They want clean water as well. They also require a supply of charcoal, in which a little flour of sulphur will be an advantage and conducive to health.

Sows should not go to the boar before they are eight months old; although in many cases they may show signs before that age. Put your sows into a good, clean, dry pen a week before their time is due to farrow; they then become settled down. Feed lightly and on the same food as you intend feeding on after farrowing. A change of food often brings on scours in the litter, and this, if possible, should always be avoided. In the pigging pens it is always advisable to have a round rail 6 or 7 inches

from the floor and wall round the pen, and use as little bedding for the first week as possible, so that when the sow lies down the young pigs will not get crushed against the wall, the rail acting as a guard. Wean gradually, as soon as you notice the young ones are inclined to feed, say at about three weeks. Give them some milk or pottage and water in a shallow trough, and let the sow out for an hour or two. They will soon learn to feed, and the run out will do the sow good. As they come on, feed well and gradually increase the sow's liberty until the young ones are six or seven weeks old. In this way they never seem to feel the weaning that has been going on. Dry the sow off, and in about three or five days put her back to the boar.

Marketing.—This depends entirely on the situation, locality, and conveniences you have. If you have a handy market, such as we have in Toowoomba, where there are always plenty of buyers for good suckers and stores, I maintain it pays the breeder better to sell his stock young than keep them on to fatten. There is no animal you can sell quicker than a pig, and a man with twenty good breeding sows on a farm can make a very comfortable turn-over out of them. On the other hand, if you have abundance of waste food of a fattening nature, it will pay you to turn that food into marketable pork. The young pigs will require to be kept growing rapidly, and will want exercise and attention. It will not do to keep them penned up until they are big enough to fatten. Give them the run of a lucerne paddock, stubble, corn paddock, or a good rich swampy patch, with a dry shed to camp in. When sufficiently grown put them in pens and top off, and you should have no difficulty in finding a market for them.

The pig industry is only in its infancy, and there is big money in it. I am sorry to say that many show committees do not offer sufficient inducements in their schedules in the pig classes. The number of pigs shown are very few, and in many cases the committees are to blame. I am afraid, gentlemen, my paper has been rather long, but the subject is one that I hope ere long will be a very large and thriving industry in our fair colony, and one that may turn in, in the near future, the almighty dollar as it has done in America.

Mr. T. WHITELEY then read the following paper, by Mrs. Lance Rawson, of Hunter's Farm, Rockhampton, on—

POULTRY.

Up to the present time, poultry-farming as a separate industry has received very little, if indeed any, attention from the powers that be—so little, in fact, that the subject was not mentioned at all when this Conference on agricultural matters was first decided upon. Some of you present may reply, and possibly with some justice, that poultry hardly comes within the meaning of the term "agriculture." I do not know under what heading it should be classed if not that, unless it be domestic, and obviously that would be incorrect. However, to whatever class the subject belongs, I am exceedingly obliged to the Minister (or whoever it is who arranges such matters) for his courtesy to poultry generally, and myself in particular, in allowing it to be included as one of the subjects for a paper. I think I may say, without being accused of "blowing" (to use one of our most expressive terms), that whatever has been done for poultry in Queensland, has been done by myself. For the last sixteen years I have been doing my utmost to induce those people who have small means—selectors, farmers, and even young people—to take up poultry-farming with a view to money-making, and the fact that the average number of letters (containing queries to which I reply) per annum is considerably over 400, says something for my success. Out of this number there are over twenty young people, both boys and girls, who are earning pocket money, and who are a sort of society or club in themselves under the title of "Mrs. Lance Rawson's pupils." Most of them are earning good pocket money, though it has not *all* been smooth sailing, and just a few have failed altogether, in most cases through getting tired of it. All members write to me every three months to report progress, or oftener if necessary and they want advice, and to each other once a month. In this way the younger members learn from the others, and I hope to develop some successful poultry-keepers by-and-by. But I am not inferring that poultry-farming is an occupation for children. That the young people can take an interest in it to the extent of making it a source of pocket money, should be one of the arguments in its favour, I think. But one has only to look at the big returns from eggs alone credited to several foreign countries to be convinced that there is money in it, and that we in Queensland are ignoring another industry that might help out a large number of our selectors who at present find it a hard matter to keep their heads above water. I am indebted to a lady friend who has been travelling through Europe for the following figures

relating to this subject. She says: "We visited more than a dozen egg farms while in Russia, most of them on the Volga. At one we saw the dealer arrive, and watched him pack 4,800 dozen eggs into his hampers, the result of three months' collection. This dealer told us that before his return to Kazan he expected to buy and pay for 84,000 dozen, and all he gives the farmers is 2½d. by our money, or 3½d. for those eggs that are the last month's laying, and have never been in the preservative. We inspected one of the places where the eggs are kept, and I was highly delighted when the man told me he used nothing but lime water—no salt or cream of tartar; just your process. Huge tanks are sunk in the ground, the eggs packed into them, and the lime water filled in. At this place they only buy from the surrounding peasantry, having no fowls of their own. Every Friday the farmers bring their eggs to be put into the tanks, and they can either sell outright or receive an advance of 1d. per dozen, and the rest when the dealer comes. I counted nine tanks, and everyone full." It would make my paper too long if I quoted further from this letter, and I am most anxious not to weary my hearers, lest they blame the subject instead of the writer. As regards importations of eggs into the United Kingdom, the value for last year is quoted as £3,962,594. It is somewhat strange that the value of eggs imported is, or has been, pretty even for some years. For instance, in going over the figures which I have noted down each year as I saw or heard of them, I find that in 1890 the value of eggs imported into Britain was £3,172,522; in 1891, £3,193,416; in 1892, £3,492,724; and in 1893, £3,562,690; and so on up to 1897, when still it stands at the £3,000,000 odd—the increase each year being comparatively small. By far the largest proportion of these eggs came from France, as far as I can judge by calculating the different values. Last year France exported into Britain 4,905,679 great hundreds (120's) of eggs, which is 957,290 great hundreds more than the previous year. From Russia, England alone received 98,000,000 eggs (not dozens) last year. In 1896 Belgium, which appears but a very small portion of the continent of Europe, sent England 300,000,000 eggs; Portugal sent 2,000,000, and Germany 400,300,000. But I have quoted figures enough. Suffice it to say that nearly every country in Europe exports some eggs, and even such seldom heard of parts of the world as the Channel Islands, Morocco, Malta, Turkey, and Egypt, which all goes to prove, in my opinion, that the industry must be a paying one, or it would not be entered upon so universally. In those old-established countries, where poultry-breeding has been an industry handed down from generation to generation, it is all straight sailing. The food grows alongside, the rains come in their appointed seasons, and the difficulties and drawbacks are easily surmounted; so far as we can judge at this distance. All the same, I have no hesitation in saying that we have a climate second to none for poultry-raising, and we only want energy, perseverance, and faith to overcome all difficulties. The days for making big fortunes all in a moment or in a few years by taking up land and putting sheep and cattle on it, or by growing sugar, are past, and these are the days of more settled and very much smaller profits; and of the coming industries, I am convinced poultry-farming will be one, either combined with other branches of farming or run in conjunction with the higher professions as it is now in many instances down south. As, for instance, Mr. L. L. Ramsay, who is an architect; Mr. Pender, also an architect and fruitgrower as well as poultry-farmer; Mr. Pye, Mr. W. White, and Mr. Hamilton, all of whom are professional men whose hobby for poultry adds both pleasure and profit to their lives. Poultry-raising will pay even by itself, but not as it has been carried on in this colony, in the haphazard, undecided manner in which most people enter upon it, without capital, experience, or intelligence. Would any farmer sow a crop without first clearing his land and preparing it, or any engineer start to build a bridge without some knowledge of the matter? Yet many a man considers himself perfectly able to become a poultry farmer if he only knows the difference between a hen and a goose; and if he happens to have failed at everything else, and become absolutely stone broke, then he turns his thoughts towards poultry-farming just as naturally as a sunflower turns to the sun. In more than half the letters I receive, asking advice, some such paragraph as the following occurs:—"I have decided to go in for a poultry farm, as it seems the only thing that requires no outlay and no previous experience." Or: "Having just lost all my money, I have made up my mind to try poultry for a living; and as I hear you are willing to advise beginners, I would be greatly obliged if you would give me some idea how to start the thing, as I know absolutely nothing whatever about fowls"—and so on. And it is this sort of people who are the ones who finally decide that there is nothing in poultry-farming because they have failed. I know of nothing in this world that will return something for nothing—no industry that can be started without capital and return a profit—unless it be a ticket in a racing sweep, which is a pure gamble. Yet there are people who imagine they

can found a poultry farm on nothing, and turn in a few hundreds the first year. A woman who wrote me from South Australia last week said: "You seem to think that I shall be disappointed, but indeed I shall be satisfied with a very small profit. If I only make £150 the first year, it will be sufficient to induce me to go on." When I tell you that the writer was starting with nine hens and a rooster, you can form some opinion of what her chances are for that very modest £150 the first year.

Do not exclaim, "Ah! that's a woman all over," because I can quote from a man's letter too, who tells me—"I've just bought fifty head of laying hens, and mean to try the poultry racket. Eggs are never under 1s. a dozen out here, and I guess 29s. per week for a start will suit me all right. But, of course, I shall go in for breeding a lot more. I guess poultry is an all-right game." What he thought later on I have not yet heard; but probably he did not find poultry quite such an "all-right game," when he found that his fifty head of hens did not produce the fifty eggs every day. Both these writers resembled Jed Watson, who—

Had a faith that urged him on, through all life's wastes and fens,
That he could build a fortune up by simply raising hens;
And those cloud-bannered palaces, reared not of stones or bricks,
Were built of all the unlaied eggs of all his unhatched chicks.

Whenever I strike a correspondent with ideas so greatly out of proportion, I take the trouble to copy out portions of the poem from which I quote, and enclose it by way of reply. If they do not understand it at first, they generally do by the end of the first year. It is called "The Hen Fever of Jed Watson," and is by an American poet, and I humbly recommend it to all poultry farmers whose ideas are beyond possibilities. And now I am back to my starting point—"Will poultry pay?" My reply is—Yes, poultry will pay, if properly and systematically gone into with *some* capital or some experience or knowledge of the matter. From £150 to £200 should start a poultry farm, provided the land and dwelling are on the ground. Five acres will make an ideal farm, divided into four or five portions—two acres to be devoted to growing grain and root crops for the fowls (for unless all the food is grown on the place it will not pay). One acre should be subdivided into, say, twenty pens or yards to hold twenty-five birds each, as when they are run in small flocks they are more easily managed, and give a better return. On the other acre there would be the breeding stock, incubator house, and rearing yards, and runs for young stock. Four breeding-pens will be enough, and such breeds as Leghorn, Minorca, Langshan, and Game could be kept. But the breeds kept are a matter of fancy, as most people have some pet variety. The great secret is to keep only such as are profitable from all points. The White Leghorn and Langshan cross gives a splendid layer, and a very good table bird. The Minorca is also an unrivalled layer. The Langshan and the Game make the best of mothers, and it is best to rear the chickens with hens, as foster mothers are a nuisance. A hen can mother from fifty to sixty chicks, and do it far better. The best way is to place her in a good roomy coop with the chicks she has herself hatched, and then at night place the chicks from the incubator with her. She will not be able to cover that number, but they will nestle round her, and if the nights are very cold a bottle filled with hot water wrapped in a bit of flannel and laid inside the coop will keep all snug and warm. A farm such as this will require nine months' start before any return can be expected. In the first place, you must have the 500 pullets to fill the twenty-five yards, and you must have a certain amount of food in hand, also you must have a reserve supply of pullets to replace those in the yards that stop laying. Directly a hen gives up laying she must be removed to a spare yard kept for that purpose, and where the non-layers can be fed till they lay again. Putting everything at the lowest possible, I reckon such a farm would turn in £4 10s. per week, and then I am only allowing for one-half the hens laying at once, whereas the chances are that very nearly 85 per cent. would be laying if they were all of nearly an age. I myself have averaged £2 10s. per week from eggs with a flock of 350 Game hens kept in the way I describe. The great secret of success depends upon getting the utmost from each individual bird, and to make a poultry farm pay you must look after the small as well as the large details, sell eggs, table fowls, purebreds, and exhibit at the local shows as well. No hen should be kept after her second year, and no unnecessary roosters at all. Great capital has lately been made out of an account of Mr. Sam Ellis's duck farm in New South Wales, which appeared in one of our local newspapers, and I know that two or three people have gone into duck-farming on the strength of it. *But*—and it is a very big but, indeed—not one person in a thousand would have persevered as Mr. Ellis has, and it is only after long years that he has struggled to success. Because Mr. Ellis happens to be successful to-day is not saying that he has not had to buy his experience by years of non-success and hard graft. Every scrap of knowledge as regards housing, feeding,

rearing, &c., &c., he has learned by close observation and intelligence of the habits and requirements of the birds he breeds. I spent some hours with Messrs. Ellis and Dobeson at the farm when in Sydney the year before last, and I very soon found that, with all my years of experience among poultry, my knowledge was worthless beside Mr. Sam Ellis's. Seeing the birds fed alone was a liberal education to me in such matters, and I admit that I learned more at that farm in one hour than I had in all the years before when keeping ducks myself. Queensland, with one of the grandest and most suitable climates for poultry-raising, has not three farms worthy of the name of poultry farm, and, to my mind, it approaches a disgrace that it should be so. The very few who go in in a haphazard way for raising a few birds for market, and selling a few dozen eggs, complain of a lack of demand. But it is a proved fact that a good supply usually creates a demand, and there is no sense in declaring an industry a failure until it has been properly tried and proved. Here we are in a city boasting something over 10,000 inhabitants, and at least a dozen rich men, and there is not a single poultry shop in the place. Some of you may wish to tell me that So-and-So did try a poultry shop and could not make it pay. Yes, I bought poultry at that shop, and I reckon that not only the shop, but the poultry too, were a failure. The public will not buy antediluvian hens a second time even when dressed as spring chickens. As a matter of fact, most of the people who try poultry-farming fail through want of knowledge of the subject. They start with the idea that 100 hens must produce 100 eggs every day, whether they are fed well or ill; that there is but one food for them—namely, maize; that the only way is to give them as much as they can eat; that fowls don't want any attention, and that, like cocoanuts in the South Sea Islands, they must grow if they are planted, and on some places I have seen they are firmly convinced that fowls should never want water. For the information of such benighted persons I beg to state that every adult hen drinks from half to a cup of water every day when she can get it, and she is not particular, for if no other source be supplied, she is quite prepared to imbibe from the nearest drain. I am convinced that one of the most prolific sources of typhoid in this city is the egg laid by the gutter-bred hen. It is the generally accepted impression that a new-laid egg is the purest and most harmless of all food, and I suppose the idea will live until the microbes have been abolished from everything else, and finally discovered in the gutter-hen's egg. In New South Wales poultry-farming is an established industry, and within the last twelve months they have appointed an expert from the old country (Mr. G. Bradshaw), whose business it is to superintend every department of the export poultry trade. In a private letter I had from him a few weeks ago, he speaks of having had 6,000 head of fowls for export through his hands between November, 1897, and March, 1898. He also touches feelingly upon the evil of introducing the smaller breeds, such as Leghorns, Hamburgs, &c., into the utility-purpose flocks, as they invariably tend to reduce size all round. I am sorry to say this is exactly what many of our farmers are doing at the present time, and it is an evil we will surely feel when the time comes for us, too, to have an export poultry trade. At present all our aim is for a good egg supply, and we are constantly introducing the non-sitting breeds into our flocks for the purpose of increasing the eggs, with the result that we lose in size; and in the near future, when I hope we will be exporting too, the trouble will be to breed out these smaller strains. I must say that personally I like the Leghorn for this climate. The only fault with it, as with all the non-sitters, is the tendency to produce such a superabundance of male birds. One year alone I averaged five cockerels to every pullet. What this colony wants is an expert, and I sincerely hope that our new Minister for Agriculture will see his way towards appointing some thoroughly practical person—man or woman, it matters not which—who would be prepared to visit the smaller holdings, where, at present, the people are making less than a bare living, and instruct and teach them how to do something with their poultry. I have quite a large number of correspondents who are making pocket money with a few head of fowls; and what children and young people can do, the poultry farmer can do on a larger scale. I do not wish to deceive anyone into believing that there is a fortune in poultry. I think I have conclusively proved that such is not the case. But there is a good living for a young couple whose olive branches are not many, or an old couple passing into the sunset of life. Combined with other industries, such as fruitgrowing, general farming, &c., &c., poultry makes an excellent auxiliary. In the not very distant future I hope we shall see Central Queensland broken up into small holdings, on which the stock will be farmed under quite a different system to the present, and where each farmer will work scientifically to get the utmost out of the land by intelligence and a trained knowledge of its capabilities, instead of this present system of good or ill luck and trust in Providence. Providence, in my opinion, only helps those who help themselves, and shows small sympathy for the muddler; and I am very sorry to have to say that

what we in Queensland are doing in poultry matters at the present time is extremely like muddling, with which remark I will bring my paper to a close, in the most fervent hope that when next a poultry paper of mine is read in this district it may be for the benefit of not only poultry farmers but also poultry exporters. (Applause.)

Mr. J. G. PALETHORPE (Toowoomba) said the pigs and the pig industry about Toowoomba at the present day showed a vast improvement on what they were years ago, and this improvement was due as much as anything to the exertions of Mr. Robinson. He believed that gentleman alone now sold by auction between 5,000 and 6,000 pigs every year in Toowoomba.

Mr. T. E. COULSON (Rosewood) said he could hardly fall in with Mr. Robinson's suggestions about pure-bred sows, as he considered that they could not be depended upon to give as many pigs as the half-bred ones. He believed, however, in the advantages of a pure-bred boar, and he also considered it should be the aim of Queensland farmers to produce as good bacon as any in the world. Mr. Coulson also strongly advocated the spaying of sows, which he said, although unknown in Queensland, was very common in the old country, where men made a trade of it. At present, if a farmer in the colony turned a lot of sows out, after a service, to fatten for market, and the buyer did not come round in time, or through bad seasons the pigs did not fatten early enough, the farmer, when he should have been able to sell them, had to keep on his hands a lot of sows far gone in pig. With spaying, such contingencies as he had referred to would cause no such inconvenience. At the Gatton Conference last year, reference had been made to a disease in pigs which caused them to lose the use of their hindquarters, and Mr. Stuckey had attributed it to a small worm in the kidney or spine. Since then he had known persons in his district who had examined the spine, &c., of pigs that had died suddenly, and although they had discovered no worms, yet had seen some red spots about as big as the end of a man's finger. Only a few weeks ago he knew a man who suddenly lost from this or a similar disease ten out of fourteen young pigs he had put out to fatten. At the time the man also expected to lose the other four.

Mr. T. A. BROMILEY (Pialba) said that some while ago he bought two pigs which, after a time, went down in the back legs very much as a foal or a dog would go down through ticks. Although no one had told him anything about worms in the back, he killed and opened one of the two, and just in the vicinity of the kidneys he found half-a-dozen long worms. The pig was then about five months old.

Mr. W. R. ROBINSON (Toowoomba) said that spaying was carried out pretty considerably in both America and England, but there the sows were kept until they were between 200 and 300 lb. in weight. In Queensland, on the other hand, there was no demand for such heavy animals, so that spaying was unnecessary. He would advise farmers who had sows they intended for the market to first give them a run with the boar, and then feed them well. They would then put on condition very fast. Of course, if a man had no regular market, this system might cause inconvenience at times, but in any event depending on a buyer to call round to take the pigs was a haphazard way of doing business. In the matter of sows, a farmer's aim should be to get good, long, roomy animals, but because one was pure-bred that did not necessarily follow that it would give a smaller litter than a half-bred one. High-class stock was apt to get too fat through extra attention. A man with a pure-bred sow as often as not treated her as a fancy animal, fed her up too highly, and consequently she would only bring forth a few pigs. Treated just the same as the half-bred sow, she would in all probability give just as big a litter. The disease that had been referred to was undoubtedly the kidney worm, and it was a difficult one to deal with. It could be dealt with, however, by causing irritation, such as by rubbing the spine with turpentine; but an injection of, say, soap and water was probably the best remedy. As a matter of fact, an injection could not be improved upon for a good many of the pig's ailments. Skim milk from butter factories, which contained preservatives, often made pigs shaky on their legs.

Mr. CHATAWAY moved that a special vote of thanks be given to Mrs. Lance Rawson for her valuable and interesting paper on poultry. This was seconded by Mr. G. F. SANDROCK, and carried with acclamation.

THE FLYING-FOX AND OTHER PESTS.

Mr. T. A. BROMILEY (Pialba) said his district was particularly infested with flying-foxes, and he did not know of any fruit which they would not tackle. About Pialba, their attacks were spasmodic. His boys might shoot a few one night and scare them off, then stay up all next night and not see a sign of them. A couple of nights after, when not expected, they would be back again. Not far from his place was a flying-fox camp, where there were at least four acres of flying-foxes ten deep, and if any gentleman present got within half-a-mile of the lee-side of that camp he would assuredly know it. This camp had recalled to his mind an incident that he had seen some years ago at Kanyan, where a somewhat similar camp existed at the time. At Kanyan there was a sugar plantation, where a number of kanakas were engaged, and, as many doubtless knew, kanakas were very fond of flying-foxes, one kanaka being easily able to account for about ten of them at a meal. One day these kanakas built huge piles of fallen timber round about the camp and damped them down. The next morning he (Mr. Bromiley) saw a great smoke arising from the piled-up timber, and millions of flying-foxes hovering about. Finally, he discovered the kanakas had managed to smother thousands of the foxes, but even then they had but barely affected the fringe of the camp. Even the kanakas did not care too much to go and face the stench inside it, and as for a white man it would have sickened him. There was something terrifying about such camps. The above had suggested to him that perhaps it would be possible to have a lot of bombs placed inside a camp, and have them fired off simultaneously with an electric battery. Such a plan might destroy an enormous number of the foxes, and bombs made of dynamite or some similar substance would not be very expensive. He believed some money had been voted by the Government for the destruction of flying-foxes in the colony, and at any rate his Board were prepared to do something towards mitigating the evil.

Mr. T. WHITELEY (Coowonga) said most of the fruitgrowers about Rockhampton were troubled by flying-foxes. As for combating them, he thought it was rather too much to ask the Government to do it, as fruitgrowers would be the only persons directly benefited by any action that might be taken. Fruitgrowers should combine and see if they could not do something in the matter themselves—such as by organising shooting parties, for instance. As for flying-fox camps, his experience of them was that the foxes in them always kept quiet during the day unless disturbed. He had seen them hanging in clusters of ten or more in depth, but not covering so large an area as that mentioned by Mr. Bromiley. Large shooting parties were often effective in getting rid of flying-foxes, and he remembered eight years ago permanently getting rid of a small camp which had settled on his property by continually tormenting it in the daytime. He believed it had been suggested to have flying-foxes inoculated with chicken cholera, and he believed if some disease of that description could be once got among them that they would spread it among themselves, and in that way doubtless there would be a possibility of exterminating them. He had heard the Agricultural Department had taken some action in that direction.

Mr. Jos. HUDSON (Rosewood) had had a flying-fox camp on his property like the one described by Mr. Bromiley. It had covered acres of ground, but it had been made to shift. The people in the neighbourhood in the daytime attacked and annoyed it day after day until it left the district. Half-a-dozen men in a few hours could shoot hundreds of foxes. Another way to get rid of the pest was by clearing the scrubs as fast as possible, for it was only in scrubs that flying-foxes camped.

Mr. G. F. SANDROCK (Rockhampton) said that, in the district he had been farming in, flying-foxes were also very troublesome, but a difficulty had been to find where they camped. He had seen them coming past his place in swarms like bees. In the North they were very troublesome just then, and, though they once had attacked the orange and left the mango, they ate and destroyed both now with equal impartiality. They destroyed, however, more than they ate. Combating them by inoculating them with some disease, he thought, was a very good suggestion. Worse, perhaps, to many fruitgrowers in the North than flying-foxes were the fruit-fly and other insect pests, and they all knew what losses had been sustained through growers raising bananas, sending them South, and having them rejected. A discovery of remedies for such pests would confer a great boon on fruitgrowers. A pest growers suffered from was the stinging of fruit by moths. Formerly these moths had confined themselves to oranges, but now they were attacking bananas. He used to get a man to go through his orchard at night and destroy the moths. This was an excellent remedy, but as his neighbours took no action in the matter, and their moths came over to his trees, he had to abandon the practice. He would like to hear from Mr. Benson as to how best cope with insect pests.

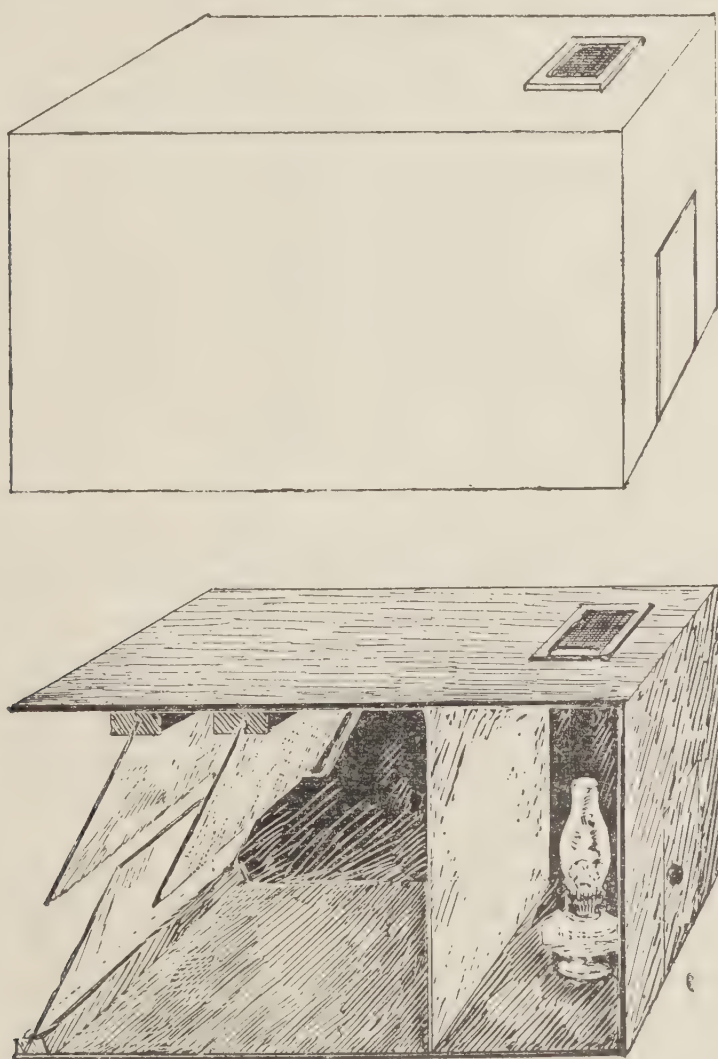
Mr. J. GILMORE (Allora) said that about three years ago flying-foxes were very bad at Allora, and on one occasion a lot of young fellows, armed with guns, clubs, and sticks, followed them to their camp and destroyed between 3,000 and 4,000 of them. On visiting the same spot after three weeks, it was discovered the camp had disappeared, and since then the district had not been troubled by the pest. An odd one was seen occasionally, but that was all. A worse pest up there were the wallabies, which were a regular scourge, and did more harm than the flying-foxes or the rabbits. Most of the land, too, where the wallabies came from was Government land.

Mr. P. McLEAN said that reference had been made to the sum of money that had been set apart for the destruction of flying-foxes. A lot was heard about flying-foxes some time ago, and as a result a sum was set apart to subsidise local effort for the eradication of the pest. Nearly all the divisional boards were advised of the offer of subsidy, but, notwithstanding all that had been said of the flying-fox and the necessity for dealing with it, the fund set apart for subsidising local expenditure in the destruction of foxes lapsed through effluxion of time, because absolutely no claim had been made upon it. Even up to date only four, out of all the local bodies in the colony, had sent in tardy applications for subsidy from the fund. In some respects the flying-fox was harder to deal with than other pests. One district over which a local authority held jurisdiction might not be troubled with the flying-fox, although at the same time it might be a breeding ground for foxes which preyed upon other divisions. He, too, had had flying-foxes as tenants of his on several occasions. He had a vast scrub on a property of his in which flying-foxes had camped in millions. He got rid of them, however, and he did so by shooting and continually harassing them. If several hundreds in a camp were shot for a few days in succession, the whole camp would soon shift. Shooting would not eradicate flying-foxes, but it would drive them into the back country or out on to the islands, and if a simultaneous attack was made on them so much the more effective would it be. Mr. J. C. Pound, Government Bacterologist, had not lost sight of inoculation as a means of attacking the pest, and a gentleman from Samoa had been trying experiments in the colony in that direction, although no definite results had eventuated from his tests.

Mr. O'KEEFE (Blenheim) mentioned that the gentleman from Samoa referred to had been in his district, but owing to the scarcity of flying-foxes he had only been able to get two or three to experiment with.

Mr. J. H. DAVIDSON (Wellington Point) reminded them that the flying-fox was very migratory; and although he might be driven away temporarily from a district, he would come back again.

Mr. F. W. PEEK (Loganholme) came from a district where flying-foxes were very troublesome, and where camps of them were to be found. About the Logan, the local boards had taken up the matter of the destruction of foxes, and he believed three of them had done something definite in the matter. With regard to other pests of farmers, he mentioned the redbill, or red-headed coot, which was a great nuisance in his district. Of course the firing of guns and shooting did drive such pests away, but they came back again, and the boards then had no more money to offer for scalps to encourage their destruction. He therefore thought, if the Government could see its way clear to give a further subsidy for the purpose, it would be to the betterment of the whole colony. Furthermore, he would suggest that some kind of combination be formed to deal with such pests, because, although one district might spend all its rates in fighting them, it would be useless unless it was backed up by the concerted action of other districts. The only remedy that he could suggest for flying-foxes was by continually harassing and shooting them. Wallabies were certainly a nuisance, and he thought it would be a great advantage if the Agricultural Department would supply cheap fencing to farmers. Like Mr. Sandroek, he had suffered from moths, particularly on his oranges, and he had thought out a scheme by which a good many might be trapped. The idea was to get a box—a kerosene case would do—and make the trap best explained by the following diagram:—



The sides of the box would be solid, with grooves for the glass. The box could be placed on saplings or suspended in a suitable place in the orchard, and through the attraction of the lamp a good many moths would probably be trapped, as well as many other insects at the same time.

Mr. J. G. PALETHORPE (Toowoomba) said at present flying-foxes were not very troublesome at Toowoomba, although he had known the pest to be very bad in past years. Still, thirty miles away there were plenty of camps. A good way to deal with flying-foxes, at least for peaches, was to get rid of

the old trees and plant early varieties. The fruit fly was a real puzzle, however, and for the present he (Mr. Palethorpe) gave it best. He knew many growers who got the bottoms of old bottles, and by putting a little molasses into these caught a great many flies in the evening, and this system appeared to give a fair amount of satisfaction. He knew another man, who had not a sign of the fly on his trees, who put carbolic acid in tins underneath them. Of course, they knew that there were often peach-trees in certain odd corners which were never touched by the fly. In such spots there was evidently something which prevented the fly from coming near the trees. He finally concluded by stating that he had a splendid lot of guava-trees which he meant next year to cover with mosquito-net. He meant to get a good crop of fruit, or know the reason why.

Mr. W. R. ROBINSON (Toowoomba) endorsed Mr. Davidson's statement about the migratory habits of the flying-fox. Mr. Robinson also mentioned the native companion, a bird protected by the Native Birds Protection Act, as a farmer's pest, and said in many districts it was a terrible nuisance. He knew one man who was destroying them with poisoned corn, which might also be a good remedy for coots.

Mr. W. D. LAMB (Yangan) said there was another pest not yet mentioned, and that was the mice farmers were oftentimes plagued with. Sometimes they came like the flies in summer, and in conversation with Mr. Benson some time ago, that gentleman had told him he was going to try and get Mr. Pound to see if he could not inoculate them with chicken cholera. If this could be successfully done, it would confer a great boon on farmers in a good many districts. In his own district the flying-foxes were as bad, he supposed, as on any part of the Downs, and they had been especially bad last summer, although he had not heard of any camps in the district itself. Shooting them had not done much good; and as for annoying and harassing the foxes as a remedy for getting rid of them, would it not be better to find some means of destroying them altogether? If they were simply made to shift from one locality they would only go somewhere else, and annoy other people. Where he lived, marsupials had been very bad a few years ago, but at present they were not particularly noticeable. In the back country there were now plenty of dingoes, and as long as they had dingoes they would not be troubled with marsupials.

Mr. P. HAGENBACH (Warwick) had had a good deal of experience of the flying-fox, and, although he did not live very far from Mr. Lamb, he had known camps to be in the district. To keep out wallabies, he had had to put up miles and miles of paling fence, and had then not been able to keep them all out, but the pest was not now so bad as it used to be. As the scrubs were cleared, the wallabies disappeared. Kangaroos were once very numerous up at the head of Freestone Creek, but now they had shifted. Dingoes were very plentiful up there; and although, as Mr. Lamb had said, they killed a lot of marsupials, yet they did a lot of harm themselves, and he thought they could be got rid of with great advantage.

Mr. A. H. BENSON said: Dynamite as a means for the destruction of flying-foxes had been tried by the Department of Agriculture in New South Wales, but without the slightest results. Bombs, exploded by an electric battery, had been tried in the camps, but the foxes had evidently noticed there was something wrong in the general state of affairs, and would not go near the trees where the bombs were, with the result that not a fox was killed. The Government Bacteriologist (Mr. C. J. Pound) had been carrying out a number of experiments, with a view towards finding a means of destroying flying-foxes with one of the microbes that had been used in the destruction of mice. It was a microbe that had been brought to this colony by a gentleman from Samoa; but so far, Mr. Pound had not, he believed, got very satisfactory results from it. However, he thought if flying-foxes ever were to be properly wiped out it would probably be through some disease; and, considering the gregarious habits of the flying-fox, an infectious disease, if once introduced

among them, would do its work rapidly. With regard to the sucking moths, he advised those present who were troubled with this pest to get the April number of the *Queensland Agricultural Journal*, and there see the article on the subject by Mr. H. Tryon. No doubt a few of these moths could be caught with traps, but probably far better results would take place if the food plants on which the larva lived were destroyed. As to the fruit fly, the best way to deal with it was by combined action to destroy all infested fruit. Such procedure would, at least, keep the pest in check. With regard to the fruit fly attacking native fruits in scrubs, it had been proved by actual experiments that at least 70 per cent. of the larva was parasitised, and never came to anything; also, that flies born in scrub fruits stuck to scrub fruits. If, therefore, by destroying the infested fruit in their own orchards, and by removing all old and useless trees which were producing worthless fruit, the main sources of infection were kept in check, he thought the fruit-fly could be at least kept within reasonable bounds. It was one of those pests, however, which behoved every man to keep his orchard clean, as it was no use one man doing so and others not. Mr. Hudson had mentioned to him that gas lime placed under the trees would destroy a number of the larva that were underneath the ground, and, no doubt, such remedies would destroy a certain percentage; but, as said before, probably the best and most satisfactory remedy was to gather and destroy all rotten fruit. Never allow the fly to come out of the fruit, and at the same time destroy any trees which are not bearing fruit of commercial value. As for the mice plagues mentioned by Mr. Lamb, he did not think they would be so difficult to deal with. Some years ago certain parts of Europe were devastated with such plagues of rats and mice, and very good results were got by inoculation. They were inoculated with a kind of mouse cholera, and he (Mr. Benson) had suggested to Mr. Pound that he obtain some of these microbes for Queensland. However, there was another way of dealing with the pest, and people who were not afraid to use poison were advised to place poisoned baits around their stacks. This, of course, was dangerous to poultry, &c., for if poultry ate poisoned mice they themselves were poisoned. It might be mentioned, however, that poultry could eat mice killed through inoculation without any consequences resulting therefrom.

Mr. T. A. LINDEMAN (Bundaberg) said the fact remained that flying-foxes could travel long distances; and while their natural foods lasted, orchards were not troubled by them. As soon as the natural supplies fell short, however, they became pests to fruitgrowers. As for dealing with them, it should be first remembered that flying-foxes were clumsy and had no steering gear to speak of. They got off a tree very heavily, and their flight was not specially rapid. He had often seen them bump up against an ordinary plain wire, and he was satisfied that if a few barbed wires were stretched high up round an orchard flying-foxes after coming in contact with them a couple of times would soon leave the orchard alone. At any rate, it would be a temporary expedient. Coots were certainly very destructive. He had seen them about canefields, and they would eat anything and everything. In New Zealand, he believed, they not only went into the fields, but they followed the carts and would rip open bags in them to get what they wanted. In canefields they attacked the bottom of the cane, down would tumble the stick, and whole acres would be thus destroyed. A remedy that had been tried was the laying of corn saturated with a preparation of strychnine. That the birds did pick up a lot of this corn was evidenced by the number of dead ones that were found lying about, but in any event the coots left the plantation, seeming to know that something was wrong. Such pests were very serious, and, as they seemed to be increasing, the spread of them should be checked as far as possible. As for the wallabies about Bundaberg, landholders had had to use wire-netting, as there was no other way of keeping them out, except perhaps with pine battens. As a matter of fact, he was not quite sure whether such battens were not the cheapest and best way of keeping out the wallabies. If these battens were placed all round

a canefield they would last a good time, and when they were worn out the adjacent scrub was in all probability cleared, so that that particular field was in no further danger of trouble from wallabies. There were few more serious pests to cane-farmers than grubs, as anyone could easily understand who had read of the destruction they had been causing in the North. Some patches of land were absolutely destroyed, and through grubs the capabilities of land were reduced 25 per cent. This was the bottom of the non-fertility of much of the land that was now under cane around Bundaberg. As instancing the number of these grubs, he mentioned that frequently a kerosene-tin full of them could be picked up by a man walking along one furrow forty chains long. In many parts of the sugar districts enormous damage was being done by this pest, but nothing was being done by many to check it. The grub pest, he thought, was one of those few matters in which individual effort should be backed by Government subsidy. Endowment on money privately subscribed for the destruction of the beetles was of the greatest assistance in combating the pest.

Mr. W. R. TWINE (Wallumbilla) said that divisional boards in Queensland, as a rule, did not appear to realise the seriousness of the flying-fox pest, and this at least was the position of affairs in his own division. There was certainly a good deal of migration in the flying-fox world, and he considered the best way to deal with the pest was to kill as many as possible of them. With regard to the introduction of bombs amongst them, he had noticed that in France dynamite had been used in the destruction of phylloxera. Wallabies, in his (Mr. Twine's) district, were a great nuisance, and when men had to sit up for nights together to protect their crops from these marsupials, they became worse than nuisances. A lot of remedies had been tried, but the only satisfactory ones were the paling or netting in of the holdings. Paling took a considerable amount of time, and netting was rather expensive. Netting was the best preventive of the attacks of wallabies, however, and he would be glad to see some scheme devised whereby farmers could get it cheap. Returning to the subject of flying-foxes, he mentioned he had seen lamps hung over the trees at night. Another pest was the caterpillar, and last season, in January, there were hundreds and thousands of acres which were cleared off by it. How this pest was to be got over he did not know, and this year it was attacking setaria and corn. Caterpillars were pretty serious in the Maranoa district this year. The fruit fly, however, had not troubled growers there much so far.

Mr. E. DENMAN (Mackay), with regard to grubs, stated that in his district, the pest having become very severe, the farmers agreed to tax themselves to the extent of 1s. per acre of cane grown. The millowners subsidised this by a similar sum, and beetles were then bought at the rate of 6d. per lb. In 1 lb. there were about 250 beetles, and last year in the Mackay district there were something like 16 tons of beetles destroyed. He regretted to say, however, that there were still plenty left, and from the North there were very depressing accounts of the position of canegrowers through this pest. As for the flying-fox, he hardly looked upon him as an enemy now. He (Mr. Denman) had spent a lot of money in fruitgrowing, but it had not paid, and he had given it best. At present the foxes left more fruit than he could sell. He had been troubled with rats also, especially with maizegrowing, and he had lost as much as 60 acres of this crop in one year through them. Grain poisoned with strychnine had proved an effectual remedy, and he had not been troubled with the pest since. Maize, however, had another enemy, and that was the aphid. In the North the speaker had grown maize in every month in the year, but nearly always found that that planted after the middle of March was spoilt by the aphid.

Mr. M. MELLOR (Gympie) said he thought there was a misunderstanding about the fund available for the destruction of flying-foxes. He believed that it was given on condition that the local authority gave pound for pound, but the feeling was that the local authorities had not the money to spend, nor did they think it was their business to do the work of destruction. In fact, he did not think it would be much use depending upon them to do it. A remedy

for flying-foxes would be a great benefit to the country, and perhaps inoculation would be as good a plan as any to adopt. He had seen flying-fox camps—very large ones—and would never think of shooting them. It would be too much of an undertaking, and the migratory habits of the foxes had to be considered. A part of a camp would be destroyed, and the rest would leave, but, after breeding again, they would only come back. If inoculation were practicable it would be easy enough to get foxes for the purpose, and at any rate plenty of them could be got in Gympie. He had scores of them coming on to a fig-tree of his every night, and during the year they appeared to destroy every manner of fruit.

Mr. H. EPPS (Childers) said that in his district the grub pest was a very serious one, and they had also raised a fund for its check, which was subsidised by the Government. So far they had destroyed about 1,000,000 of these grubs, but he considered the question of their destruction should be on a legal basis. Contribution to the fund should be made compulsory, inasmuch as under the present voluntary system there were a number who would not assist in the work of extermination. He thought a small Act should be passed to permit of a levy being made, upon those interested, in a given area for the destruction of grubs. Such an Act was suggested to the central Government eighteen months ago, but the reply was that the matter would be included in the Local Government Act that was then being prepared, and would be dealt with there. At the time he had pointed out that this would be undesirable, because divisional boards had other work to do, and many of the remarks that had been made there that day had clinched the opinion in his mind that the work should not be done by divisional boards. At any rate the Local Government Act did not go through, and they did not know whether it would go through next session. He would therefore like to see a resolution passed that the Conference was of opinion that a short Bill should be presented to Parliament to deal with the matter, as it was a very important one, and one that should be dealt with. It was only very recently that he had seen that a number of planters on the Johnstone River had been completely eaten out by grubs.

Mr. E. SWAYNE (Mackay) agreed with what Mr. Epps had said, and in Mackay several farmers had been ruined through the same pest. There the Government had been endowing voluntary subscriptions, and last year between £500 and £600 had been contributed for beetle destruction, the subsidy on it being 17s. 1d. in the £1. About 16 tons of beetles were destroyed. This year between £500 and £600 had again been subscribed, and had been endowed by the Government at the rate of 14s. 9d. in the £1. So far about 14 tons of beetles had been destroyed, and the people of the district had responded so readily that the necessity for legislation had not pressed itself upon them. However, he would not oppose Mr. Epps in his desire for such legislation; although so far as Mackay was concerned it had not been wanted up to the present.

In reply to Mr. Bytheway, Mr. SWAYNE said the grub and the beetle were two different forms of the same insect. The damage was done by the grub, but the pest was more easily dealt with when in the beetle stage.

Mr. CHATAWAY said he had been asked by Mr. Whiteley to state that Mr. Ranking, of Rockhampton, had some years ago made a box trap similar to that suggested by Mr. Peek, and that it had not been a success. With regard to compulsory taxation for grubs, what Mr. Epps had said was very true, but in all these matters it was necessary they should take wide views. They had to be certain they did not create a strong opposition to the legislation. There was in this case, as in all others, a minority that required protection. The Isis district might be taken as an example. There was a large area there which was interested in suppressing the grub pest. But again there was a large area outside which had no interest whatever in combating the pest, except the general interest they had in the country. They had no special interest which would justify them, in their own opinion, in contributing directly towards the suppression of the pest. In many

districts proposed legislation to provide for any form of compulsory taxation would create such strong opposition as to defeat its own objects. He only threw this out as a suggestion to remind them whether it would be altogether wise to force such taxation upon the sugar districts. He had been very pleased to hear Mr. Lindeman's remarks relative to the efficacy of local effort against flying-foxes. Queensland orchards were not so big that they could not be protected from the attacks of flying-foxes. He had seen barbed wire work excellently in this connection. Once a few of the foxes' wings got torn by the wire, the orchard was relieved of their attentions. They then came to a matter in which all were greatly interested—namely, inoculation. The bacillus discovered by Dr. Löffler some few years ago was the one referred to by Mr. Benson as being successful in exterminating mice in the South of Europe. This bacillus, which was a purely laboratory discovery, gave mice a kind of typhoid, and it was the same one which was brought over by Mr. Reid from Samoa, and tried by him under Mr. Pound's supervision. Some years ago it was stated by the Foreign Office that flying-foxes were dying rapidly in Samoa; and it was suggested that this was possibly the result of this typho-murium bacillus discovered by Dr. Löffler. He (Mr. Chataway) remembered, however, that the British Consul at Samoa was very careful to say that there was no evidence whatever to show that the deaths among the flying-foxes resulted from the introduction of the bacillus referred to. Mr. Reid, the gentleman from Samoa, whom doubtless most of them had heard of, had given a trial of the remedy (which, by the way, Mr. Reid called his own specific) before Mr. Pound, but the latter was not, on the results shown, convinced of its efficacy. First of all, it had not been proved that the disease was readily communicable. There was no doubt that one or two foxes that were infected did die. But that was not sufficient. It was essential that the disease should be communicated quickly from one animal to another; and more than that, the virulence must be permanent. That is, it should not lose its force as many did, but should be transferred from generation to generation unimpaired. This Mr. Reid did not show definitely, and this of course was what was most required. He might add that Mr. Pound had had this particular bacillus in cultivation for over two years in his laboratory. Mr. Benson had brought up the matter of inoculation for mice, and perhaps Mr. Pound might see his way to exterminate them with the typho-murium bacillus. There was one thing the speaker had noticed about the fruit fly, and that was that while certain trees were attacked by it others were severely left alone, although alongside. If farmers ever noticed cases of this kind, it would be extremely valuable if they followed them up, and communicated the results of their observations to the Department. The Department's experts were, of course, eager to secure the co-operation of fruitgrowers in the discovery and dissemination of remedies for combating fruit pests.

THE NEXT CONFERENCE.

Mr. W. R. ROBINSON (Toowoomba) said that before the session closed he desired to bring up the matter of the next conference. He thought he was right in stating that it was the wish of most of the Southern people that the next conference should be held in Toowoomba about March, 1898.

Mr. E. DENMAN (Mackay) said one conference had been held in the Southern part of the colony, and another in the Central. He thought the next should be held in the North. Messrs. Henry, Lamb, Hagenbach, and Sandrock also expressed themselves in favour of the next conference being held in the North.

Mr. LINDEMAN (Bundaberg) suggested that the venue of the next conference be left in the hands of the Agricultural Department.

Mr. CHATAWAY said the delegates evidently assumed the conference was going to be an annual affair. (Voices: "Yes.") Whether the Department would be able to hold the next conference in the North was, however, a matter

that required a good deal of consideration. It might not be possible to do it, at any rate, next year, but, as Mr. Lindeman had said, he thought the matter could be best left in the hands of the Department. If the holding of it in the North were practicable, they might rest assured the Department would be only too delighted to hold it there.

RESOLUTIONS.

Mr. E. SWAYNE then moved, and Mr. MARKS seconded, the following resolution, which was carried unanimously :—“In the event of these conferences being continued next year it is desirable that a committee, comprising Messrs. F. W. Peck, M. O’Keefe, S. A. Lindeman, T. E. Coulson, T. Whiteley, W. R. Twine, and E. Swayne, be appointed for the purpose of corresponding in the interim, and, if possible, bringing forward at the next meeting a scheme for carrying into execution the ideas contained in the papers that have been read at this meeting dealing with organised and co-operative action on the part of farmers.”

Mr. DENMAN then moved, and Captain HENRY seconded, the following :—“That this Conference, composed of delegates from every part of the colony, desires to urge the Government of Queensland and the Governments of the other Australasian Colonies to point out to the Imperial authorities that the bounty system now in vogue in European beet-producing countries threatens to extinguish the cane-sugar industry in Queensland in common with all British cane-sugar-producing countries, and to request them, by countervailing duties or by such other methods as to them appear best, to protect the colonies from this unfair competition.” On being put, this resolution was carried, the only dissenting voice being that of Mr. E. Bytheway (Gympie).

SEVENTH SESSION.

FRIDAY EVENING, 13TH MAY, 1898.

COFFEE.

Mr. T. A. BROMILEY (Pialba) : I must apologise, Mr. Chairman, for not having prepared a paper. I must say in the outset, before proceeding with the matter of coffee-growing, that it must be quite clearly borne in mind that what I have to say has only reference to what I myself have done. I shall make no reference whatever, except perhaps by the way, to what may have been done in other coffee-growing countries. I might have selected some other subject, but from what I have seen in the *Agricultural Journal* I concluded there was a considerable amount of interest in coffee. I thought, perhaps, the experience gained in six years by myself might be of use, particularly as I started feeling very gently into it. I did not invest a very great amount of money in it, because I was not at all sure how it would do as a plantation. I had seen it grow under all sorts of conditions. I had seen it grow in all aspects, in various qualities of soil, and at various altitudes above the sea : from just a little above the tide water to where I am now, and so far as I know I have the highest-point growing coffee in our district. I have seen it doing well on hungry granite. I have seen it growing on almost a stone quarry, where fifteen or sixteen year old trees gave splendid crops ; only in one case have I seen it fail, and in that case it was right on the sea-beach, or nearly in the sea-sand, but certainly not more than 20 feet above tide water, and exposed all the time to the northerly winds. There has been a great deal said about this plant coffee by growers, and those who have had experience in foreign countries, about how it should be treated from the seedling right away up to its maturity. I have found that at many points we touch, but I have also found there are many points to be observed here that do not tally with the methods adopted in coffee-growing countries. Before going on with the methods I have adopted in my plantation, I

may say I have been asked over and over again, What are the profits? We all know that profits hang upon a thousand matters. What may be profitable one season may be unprofitable in another. When I have finished I shall be pleased to answer as many questions as you may ask, and should I miss anything I hope you will question me as closely as possible. What you may have seen in the case of one or two trees, or a dozen or so, planted under particularly favourable circumstances, sheltered from the winds, in moist localities, in sunny aspects, grown in gardens, tended and nursed, is no criterion of what a plantation will do. When you have 1,000 trees to look after it is quite a different matter, and in this connection I may say that data that one gets from what is written of coffee production in foreign countries cannot be taken as safe data for us to go upon, and I am backed out in this by Mr. Hepburn in his experience in the West Indian Islands. He has said to me to-day that he has found in Queensland that his West Indian experience is not always reliable. Methods that will do there will not do in every case in this colony, and his words were to this effect: The general principles of cultivation hold good all over the world, but the climatic vicissitudes and the adaptability of the plants themselves have all to be relearned when you come to Queensland. Now to commence where I commenced, and you will pardon me if I seem to go too far down into it, but I shall assume that you know nothing at all about the matter. In the first place I was very careful to select a piece of land sufficiently high above the sea-level, and near enough to the sea to get the benefit of the sea air, with a somewhat moist atmosphere, the right position, and the right texture of soil. In doing so I bought a piece of property which stands something like 400 feet above the sea, and which is about a mile from the sea. The whole of the intervening country is open—that is, from my place you can look right over the trees into the sea. It is red volcanic soil, and is all the same, being characteristic of red volcanic ridges. It is very friable; so friable, indeed, that you can force an ordinary bar down three or four feet into it in ordinary weather. I had observed coffee ever since I was a boy. We had coffee growing in 1863 on the banks of the Mary, but this finally got carried away by flood. I have watched it ever since, and I may say it is a very old love of mine. In 1888, when I travelled through the district where I come from, I advocated among the farmers the growing of coffee. I came across an ex-Ceylon planter, and when I spoke of coffee-growing he laughed and said, “You cannot grow coffee in Queensland.” “Well,” I said, “I have seen growing here what is said to be coffee”; but he replied, “You cannot grow it.” This same gentleman wrote to me some days ago asking for 14 lb. of coffee seed. So he was mistaken. I got a friend who gave me 100 trees, and it is upon the results obtained from those 100 trees that I shall now speak. I prepared my beds in this wise: I very carefully dug the soil to a depth of from 16 to 18 inches, forked it, and was very careful to take out every root, for I knew that I should have to shift the plants, and I did not want anything to interfere with them in the removal, for I had heard that to injure the taproot of the coffee-tree would do the tree serious injury. I levelled down the ground fairly level, just as you would level an ordinary seed bed, laid off the beds 3 feet wide by 6 or 7 feet long, with paths between. Having laid off the beds, I put in a number of forked sticks, leaving the forks about 5 feet out of the ground, and put saplings on these forks. Over the top of the latter I strewed dried banana-leaves, not altogether intercepting the sun, but making a fair shade. To keep the leaves in their place, I laid on a few more saplings. These lasted twelve months longer than I wanted them. Please remember that there is technically a difference between berry and cherry. Cherry is the purple fruit from the tree. Berry is the prepared berry ready for market. Parchment is after the coffee has been pulped and dried. It is then surrounded by a parchment-like covering, and in that stage it is called parchment. Then I separated the berries by pressing them, and took them out; planted them very carefully in the ground by means of a small dibble. I put them down just about 1 inch or $1\frac{1}{4}$ inches, and took care to put the round side up and the flat side down, for I noticed the germ came out from the flat side. So that in order that the

berry should not have to turn over in the soil, I planted the flat side down. I then considered the seed was planted. It happened to be a dry year, and I had to repeatedly water, making a point of never letting it dry and never having it wet, just keeping in a moist state. It seemed to me an unconscionably long time before the berries came up, and I think I was watering those beds for six weeks before any sign of the young trees appeared. Eventually they all seemed to come up at once, and start away vigorously. I left them there until the right time for planting—the spring of the year, about July. I then raised the plants, and by that time they had attained a height of from 6 to 7 or 8 inches. Holes had been prepared—it was new scrub land—about 15 inches square and 18 inches deep. These holes had been prepared about a month before I was ready to plant and the soil left out of the hole. In returning the soil to the hole I did what a good fruitgrower would do—put the subsoil in first, and the surface soil on top. When placing the trees in the holes I took care that the taproot, in cases where it had been injured in any way, was very carefully cut with a sharp knife. Those that had not been cut seemed to do best. Then we filled in the soil very carefully, but we did not pay very much attention to the laterals. In some cases where the earth had fallen away altogether we took a little care to straighten out the laterals. We then filled in to the collar of the plant with loose soil, and then, instead of stamping and pressing in, as I would have done had I known better, I had a man who poured water in round the tree so as to grout it right in. Then I filled in a little more of the soil and gave it a little more water. I then covered it with a little dry soil and left the plant. I then had some shingles split, and put three or four broad ones on the afternoon sun side of the plant—on the west side and a little round to the north. I found it was necessary to keep these shingles there for twelve months. The plants thrived all the better for it, as the afternoon sun, you know, on most plants is very trying, particularly on coffee. Some plants that I had neglected to attend to in this way suffered a good deal. At the end of twelve months they were 18 inches high. In another twelve months they were up to 2 feet 6 inches and 4 feet high. I had then to get stakes. I catch the northerly winds, as well as some others, but the scrub is felled in such a way that the plants are not very much exposed. I tried them first with strands of manila, but found that these afterwards were very unsuitable, as they used to rot in wet weather and in the dry weather they would stretch. The result was they gave the plants too much play. Our worst time is the season of south-easterly gales. I have tried an experiment which has succeeded with me very well. I obtained several small coils of No. 18 galvanised wire; there is a swamp not very far from me, and I stripped some thick tea-tree bark. I cut this bark into nice convenient pieces, and drew them round the trunk; then with two separate wires I attached the trees to the stakes. I twisted the wire on the stake in such a way that it would not slip down. This answered very well indeed. At two years there were a few flowers and a few berries, but not many. I think it would have been better had I taken them off. However, I left them. At three years I got what I should consider a fairly good crop, and I took off what averaged to me all over my 100 trees 1 lb. of berry* to the tree, for which I obtained 1s. 3d. per lb. cleaned and ready for market. In the fourth year off the same 100 trees I got 275 lb. of merchantable berry, which, I think, from all I have read, was an exceedingly good return. I may here say I was now extending the plantation, as I was satisfied it was going to be a paying crop. The 275 lb. I also disposed of at 1s. 3d. per lb. Now I was met with a difficulty. I had not very much money, and I did not want to spend money in expensive machinery until I had thoroughly tested the crop. A difficulty arose about a pulper, so I just set to work and made one. I made a pulper on the lines known in Ceylon as a rattle trap. By it a man and a boy could put through per day 30 cwt. of cherry, and it has answered up to this

* The word "berry," according to Mr. J. Dansey, manager of the Mackay Coffee Estate Company, means "ripe fruit." *Bean* is the term for marketable coffee. One pound of berry would be a poor return from a three-year-old tree.—Ed. Q.A.J.

season very well. With regard to the hulling, I have to thank Mr. McLean for his courtesy in sending to me catalogues of hulling machinery. The more expensive ones would have suited me, but I had not the area for such machines. The smaller machines I did not think much of. I know something of machinery, and know what small machines mean. You will understand that coffee must be pulped, fermented, and dried, the fermenting and drying being technically known as the drying. In this I had something to learn, and I had no one to teach me anything at all. The Department could only give me matter that had been written for other countries. I did get a book from Ceylon, and although I now see it must have been antiquated, yet I did get a good many hints from it. My method now is to pulp, and put the pulped berries into a large wooden barrel cut in halves. I had also a wine vat that I used. I put the pulped berries into the receptacle, and generally the fermenting takes from thirty to thirty-six hours, it depending upon the temperature. If the thermometer ranges from about 75 to 80, the berry ferments very readily in from about twenty-four to thirty-six hours. I know now how the viscid matter which lies between the skins is disposed of. Carefully wash and get the parchment clean. Now, I had a difficulty when I arrived at this stage. I had read of these barbecues, and saw they were most expensive things, and I had not the quantity as to justify me in incurring that expense. I levelled off a piece of land, covered it with cotton sheets, and put the parchment on these. This would not do. I could only dry from the top, and the process was not quick enough. I then built rough tables—drove stakes into the ground, nailed transomes across them, and in the opposite direction nailed small battens. On these I spread the sheets, and the coffee on the sheets. This did very well, but in the fourth year I was better prepared. I made a great number of trays of 3-inch battens and sheets of perforated zinc 7 feet by 3 feet. These latter I cut exactly in the middle, and made frames of the battens just large enough to take one of the half sheets of zinc. I secured the zinc to the battens by means of smaller fillets and sticking into them a strong tough bar of wood to prevent a sag in the zinc. Then I made tables again, the sticks supporting which I drove far into the ground, about 2 or 3 feet, and laid the trays on these. These did splendidly. So far as it goes, I think natural sun-drying is perfect. Mr. Hepburn, I see by the *Agricultural Journal*, has an idea of a rake for turning the parchment over, but I have found that our hands will turn it well and quickly enough. Now, I had a difficulty in knowing when the parchment was sufficiently dried. Some times I overdried, the result being that the berry lost its shape. Then I went to the other extreme, and removed the berry before it was properly dry. In this case it would not harden, although it did not deteriorate. Eventually I found out that it changes colour slowly from greenish-grey to a slaty-blue, and I found as long as I could see through the horny outer covering that it was not dry enough, so I watched for that change. Before the berry lost its shape I bagged it. I have some berry bagged two years ago, and I fancy it is better now than what it was then. Now about labour, and that is a great point. My quiver is full, and I have a big little family. When it comes to picking, with the assistance of a few children from round about I can slip through the job very well indeed. Children are by far the best pickers. I do not think a coloured man will ever make a good coffee-picker. I do not know anything about the Tamils, and how much they can pick in a day, but I have tested myself. I took the coffee at its very best at the first picking, and when the trees were loaded. I set to work as soon as I could see, and I picked for all I knew until breakfast. After that meal I came out again and worked till midday. After dinner I picked the rest of the day. All day I had picked my best, and had 110 lb. of cherry as a result. That is not far off two bushels. It is said a Tamil can pick $2\frac{1}{2}$ bushels per day; but if he does, then an overseer will have to go behind him. I thoroughly picked the trees, and left nothing behind that I could see or reach. What I did on that day, however, cannot be taken as fair data to go upon, as I do not think any white man would work as I did and get the same result. What it cost me

per lb. for picking by my own children I have estimated at under $\frac{1}{2}$ d., but I think $\frac{1}{2}$ d. per lb. is a fair estimate for such labour. My yield has been from 18 to 20 per cent. of berry to cherry. Basing a calculation upon that, it would take about 3d. per lb. on the finished berry to pick it, and probably that would be a safe price to reckon upon. At present Harper and Co. are giving upon the Herbert 9d. per lb. for parchment. According to my calculations, 12 per cent. is lost in the parchment. That would bring the value of the finished berry up to about 10d. or $10\frac{1}{2}$ d., and, deducting 3d. of this for picking, the value can be estimated at 7d. per lb. I have on my place different distances for the trees. Some are 7 feet by 7 feet apart, some 8 by 8, some 9 by 8, and on one patch I tried 10 by 12. By taking 8 by 8 or 7 by 7, there are about 600 available trees to the acre. There should be perhaps more, but there are always some that come to nothing. From such an acre I would get about 1,800 lb. of finished cherry if the yield all over the plantation kept up to the average of the 100 trees I have been chiefly referring to to-night. By taking the price mentioned as a basis, the net return per acre would be over £50. Of course it would not do to consider that as a safe estimate, as in practice you might get a long way below it. However, I am satisfied that there is no other crop that will pay so well, not even sugar. (Applause.)

In reply to Mr. P. Hagenbach, Mr. BROMILEY said he did not think coffee could be successfully grown on the Darling Downs. His test was the temperature. If the outside heat fell below 45 degrees the coffee-tree suffered, and if it was a young one it would in all probability die. An old tree might stand out, but as said before he did not think coffee would do on the Darling Downs.*

Mr. P. McLEAN concurred in this opinion.

Mr. F. W. PEEK (Loganholme) wanted to know the age of Mr. Bromiley's children. Did Mr. Bromiley not think he gathered his coffee at the expense of those children's education? Also, did Mr. Bromiley cultivate between the rows in his plantation?

Mr. T. A. BROMILEY said the youngest of his children was six. He took the top of the trees with his eldest son, and he might say that his eight-year-old child could pick 56 lb. of coffee per day. It happened that the harvesting of coffee occurred during the winter holidays. In one of the States of the United States the farmers went in largely for cranberries, and during the cranberry season all schools were closed. In the hop season in England whole families go down and do the picking. No white man could pick coffee at $\frac{1}{2}$ d. per lb., but it pays a family with plenty of children.

Mr. WM. DEACON (Allora) asked how many acres of coffee would pay a small farmer.

Mr. S. STEPHENS (Nerang) said that, judging from what Mr. Bromiley had said, from about $2\frac{1}{2}$ to 3 lb. of berry per tree was a fair average. There was a neighbour of his down at Nerang—he had certainly only a few trees—one of whose trees yielded 11 lb. of berry and another 8 lb. This year there were certainly more berries on the trees than there were leaves.

Mr. T. WHITELEY (Coowonga) wished to know where the word "bean" came in in the technical terms of coffee. He thought Mr. Bromiley's system of planting would be very expensive in connection with large areas. From his (Mr. Whiteley's) own little experience, he did not think the full process described was necessary, and he considered if the seed was planted where it was intended the tree should be, it would be better. Then there would be no fear of breaking or having to cut the taproot. The cleaning of the berry also added too much expense. The price that Mr. Bromiley had given as what he had received for his berry was 1s. 3d. per lb. The manufactured article could be got for 1s. 6d., so that there was a very small margin left for roasting, grinding, and marketing.

A VOICE: What about chicory and maize?

* A coffee-tree taken from Nundah (2 years old) and planted at the Toowoomba Grammar School died during the first winter.—Ed. Q.A.J.

Mr. WHITELEY doubted whether chicory was mixed with the coffee in Rockhampton, and if it was he was under the impression that the mixture, as in the old country, would have to be sold under the title "coffee and chicory." Chicory, in any event, could easily be grown in the colony. For his own part he did not think that Mr. Bromiley had by any means proved that coffee was a paying crop for Queensland, and, unless there was a combination among growers to purchase machinery, he did not think it would be possible to clean it on a paying scale. He had grown coffee himself on a small scale.

Mr. J. E. NOAKES (Maryborough) had seen Mr. Bromiley's plantation, and could bear out what that gentleman had said. Nor did he think he was at all out in his estimates. The days of 150 per cent. profits were gone, as those men knew who got £2 per acre profit from maize where they used to get £10 formerly. Mr. Bromiley was the first man in Southern Queensland to approach the question of coffee culture in a proper manner, and he considered his efforts should receive every encouragement. Mr. Bromiley's trees were about 4 feet high.

Captain HENRY (Lucinda Point) desired to know the size of the coffee-trees referred to by Mr. Stephens, and which yielded so well?

Mr. STEPHENS (Nerang) said one was about 9 feet high, and the other 4.

Captain HENRY said he had been informed by a Ceylon planter that $\frac{1}{2}$ lb. of coffee per tree, just as it came off the tree, was considered a very good yield.

Mr. E. DENMAN (Mackay) desired to know the variety of coffee grown by Mr. Bromiley?

Mr. E. BYTHEWAY (Gympie) asked if coffee was affected by any pests.

Mr. P. W. CAMERON (Ipswich) sought information as to how far from the coast coffee could be grown.

Mr. T. A. BROMILEY (Pialba) said he only had five acres under coffee, and the reason he had not more was because he was only trying it. He was testing it experimentally and according to approved lines. As for the returns from coffee, he could tell them that 3 lb. per tree was an exceedingly good yield. He had seen many trees from which it was possible to get 14 lb. of berry per tree. As there was such a confusion in the using of terms, he would again say that the "cherry" was the red or purple berry that was picked as a fruit direct from the tree. After the first process of pulping came the parchment. The seed coat within the parchment was known as the silverskin. When the coffee was got out of the parchment and skin, and was ready for roasting, it was in the "berry" stage. As for planting coffee seed in the place where it was intended the trees should grow, he would suggest that Mr. Whiteley try it. He had only been relating that evening strictly what he had done himself. He knew of one tree eleven years old which had yielded 33 lb. of berry in a season, and he had seen seven trees among them give 100 lb. of finished berry. He had not personally seen the 33-lb. yield on the eleven-year-old tree, but he had the word of the owner—who was a gentleman whose word could be taken—that such a crop had been taken off and sold. This particular tree was 14 feet high, and had a radius of 6 feet. It was a phenomenal tree, and every limb of it was pulled down by the weight of the fruit. The other seven trees he had referred to were grown on hungry granite on the bank of a creek some twenty-five miles inland, and he knew for a positive fact that they had yielded 100 lb. of berry in a single crop. Those trees were nearly twenty years old. Such trees, however, were record ones, and it would be unwise to take them into any calculations. If a grower in a plantation was successful in producing an average of from 2 to 2½ lb. of berry per tree, he would get as good a crop as could be produced in any part of the world. It should be borne in mind that in a plantation the trees must not attain any height. In the first place, if they grow high, the trees are pulled a great deal about by the wind, and the wind is a great enemy to the coffee. Again, he was convinced that it cost every penny of the berries to collect them with ladders. In Ceylon it is said

they have the trees down to 2 feet, and put from 1,000 to 1,600 trees into an acre. That, of course, would make a difference in the yield per tree. Coffee ripened in the cool part of the year. The beans could be planted in the places where the trees were to be, but although they would not rot in the ground it might be several months before they showed above. If rain did not come at the right time, the seed remained dormant in the soil. If the seeds, on the other hand, were planted in a nursery, the grower was sure of them. He always sowed three times more seed than he required plants. It should be remembered that there was always a best, and with a nursery, the planter was able to secure that best. As for the value of coffee: Coffee in bond was worth 11d. per lb. in Queensland, and to this he believed another 4d. had to be added for duty. Coffee lost from 12 to 18 per cent. of its weight in roasting. Notwithstanding this and the cost of the roasting, it was ground, labelled, and marketed, and sold at 1s. per lb.! These were facts, and anyone could make his own deductions. With regard to varieties, he was growing two sub-varieties of the Arabian. He had tried the Liberian, having obtained seed from Messrs. Cutler Bros., of Clump Point, Townsville; at the time the seed did not look much, but he managed to secure 120 young plants from it. He kept them for some time under cover, but on the very first breath of cold air they perished. He therefore concluded the Liberian was too tropical for Queensland, but in any event it had other qualities which did not commend themselves to his eyes, and amongst these was uneven ripening. At present he was growing the ordinary Ceylon variety, and also a kind grown from seed obtained from Coorg, in India. He had great faith in this Coorg variety, as it was very robust, stood drought and rain well, and was an excellent cropper. It had a thick-fleshed leaf. Up to the present he had not observed any pest or disease injuring his coffee. There was nothing the matter with the leaf, only that he had headed-in the trees very severely. In doing this, for want of experience, he had probably headed-in at a wrong stage of growth; as a consequence the trees bore very heavily right up to their tops. Then followed ten weeks of dry weather. Next time the cherry carried well, but all from about 2 feet from the ground to the top of the tree was only light drift stuff. All the trees he did not top carried well, and gave full berries. So he concluded the heading should only go down into the brown bark and not into the green. His place was just within sight of the sea, and he was about a mile and a-quarter from the beach. The aspect was easterly and round to north-east, some of the plantation having a northerly aspect. In the particular spot he was, however, he did not like the northerly aspect, as a strong reflection from the ocean was thrown on to the trees. He would always avoid the west. The texture of his soil was all the same as far as he had gone down—about from 8 to 10 feet.

Mr. CHATAWAY thanked Mr. Bromiley for the valuable information he had supplied. Already within his own knowledge, on a very small area of country, something over 100,000 coffee-trees had been planted. Even further North, at Cairns, a good deal of land had been put under coffee, and a great deal of interest was generally being taken in the industry. Mr. Bromiley's paper would bring the matter prominently before the Southern end of the colony, and would probably do a lot of good.

Mr. H.^cE. WYMAN, of Ipswich, then read the following paper on—

NOXIOUS WEEDS AND THE NECESSITY FOR THEIR ERADICATION.

Under the heading of "Noxious Weeds" may reasonably be classed Lantana, Noogoora burr, Bathurst burr, Prickly-pear, *Sida retusa*, Nut-grass, and others. I am sure I need offer no apology for introducing so important a subject to this Conference, for, as practical and observant men, you must be well aware of the extensive area of land that has become practically useless through the spread of these noxious weeds, every year making it more and more difficult to cope with. Every day it is becoming more apparent that, if the pest is to be effectively dealt with, some different method must be adopted in the future than in the past. Whether such action should be by joint action of the local authorities or by the Government is a question for future

consideration, but it is certain that, unless action be taken, and that quickly, to cope with the difficulty, noxious weeds will become as great a pest as the rabbits, and will mean a large expenditure of money. In the West Moreton district, Noogoora burr has spread to an alarming extent. I am assured that ten years ago this weed could have been eradicated for £10. Now it would cost thousands, and no doubt the same can be said about the other weeds in other districts. The Legislature has given divisional boards power to deal with these pests, but municipalities have no such power, which is a serious obstacle to united action. In the Divisional Boards Act, the legal power given them is quite adequate to prevent the spread of this evil, and if municipalities had the same power something might be done towards checking the spread of these pests, and eventually eradicating them altogether. This defect in the latter, together with what is everybody's business is nobody's business, has allowed the pests to obtain such a strong hold as almost to render it a national question, and one that should be intelligently and systematically dealt with by special Act of Parliament. Take the first three named pests—Lantana, Noogoora burr, and Bathurst burr. These threaten to overrun many a fertile district and render it practically useless. Why? Because one board or owner may use every effort to eradicate the weeds from the division, but if the adjoining lands (some of which are on higher levels) are not treated in a like manner, the result is obvious. The first shower of rain, the first fresh in river or creek, carries the seeds and germs down to the clean land again, to choke all cultivation and grass, and to strike dismay into the heart of the man who honestly tries to do his duty and help himself, his posterity, and his country. Again, we often find these seeds carried for miles by the birds as they fly from tree to tree, by horses and cattle when taken from one place to another, and by native animals in their travels. A state of things hardly to be understood is found in connection with lantana. This is known and treated in Queensland as a noxious weed, and, as such, strenuous efforts are made to eradicate it. On the other hand, it is catalogued in the nursery lists of flowering shrubs at from 1s. to 3s. 6d. per plant, and, as such, is daily brought into the colony in order, one would think, to prevent its being stamped out of the land. It is past comprehension how such a state of things is allowed to exist. In the case of most seeds, if we destroy the young plant that grows from the seed, we have killed the effects of that seed. This is not the case in the Noogoora burr seed, for it has two germs, and therefore grows twice. Very often one germ will grow one season, and the second in a year or so's time. The prickly-pear has one good point. It does not spread quite so fast as other weeds, but even a leaf of it dropped on the ground will grow, and so start it in another locality. The pear is now being somewhat made to pay for its footing, for in many cases the plant and fruit have been used for pig and cattle food when boiled, and it is now also being made into ensilage. The boiling of the pear softens all the prickles, and so minimises the danger that would otherwise present itself to all who look to the future health of their stock as well as to keeping them alive for the present. From *Sida retusa* it is possible to make hemp, but up to the present it has been found too expensive to be able to do so and make it pay. Hence *Sida retusa* must and ought to be treated as a noxious weed. Nut-grass is puzzling the heads and hearts of many of our best farmers. Scores of farms have (as in the case of the pests already mentioned) had to be abandoned because the nut-grass has got too secure a hold to check it. In some few instances crops can and do keep it down and thrive where it is; but the exception only seems to serve to prove the rule. It will be seen from the remarks I have made about these weed pests that the time has arrived when something must be done, and done quickly, if we would keep the farming industry alive in Queensland. This end can only be attained by concerted action on the part of all concerned—from the Government on the one side to the smallest farmer and landowner on the other. The Government needs to provide the laws giving power to cope with the matter, and local authorities and landowners must then work in harmony to the end of freeing the land from these noxious weed pests, which are a menace to the future of our fair colony. (Applause).

Mr. P. HAGENBACH (Warwick) said the destruction of burr and other noxious weeds on roads was a great burden to divisional boards. If any fresh legislation was carried in connection with the subject, he hoped greater powers would be given the boards to deal with such pests. Only the previous Saturday it had been brought to his notice that a great quantity of Noogoora burr was making its appearance in his district. Action was taken, and the chairman of the board was empowered to send men round to find and destroy the weed at once. There were other weeds that also wanted looking after, and amongst these was the prickly-pear. The prickly-pear was allowed to grow on

all reserves and everywhere else around his district, and, if some steps were not taken now to check it, checking it at all would soon be impossible. Cattle eat it, and by this means it was rapidly spread throughout the country. Adjoining his own residence there was Government land covered with prickly-pear, and he would venture to say that, if this land was allowed to remain as it was for another five years, at the end of that time nobody would buy it, as the eradication of the pear from it would be so costly. With regard to Bathurst burr, he thought, in order to lighten the drains on the board's finances, that a clause should be inserted in the new Local Government Bill giving the board power to compel owners of land adjoining roads infested with burr to destroy the weed. Great assistance could be rendered to local authorities in their efforts to eradicate burr if this was done. Last year, in his own division the board had spent over £120 on Bathurst burr destruction, and he thought the matter could have been largely better dealt with if individuals had been compelled to destroy the burr on the roads opposite their own holdings. Again, when contracts were let out for burr destruction, it was a difficult matter to get the contractors to do their work thoroughly.

Mr. J. HUDSON (Rosewood) considered that Mr. Hagenbach had hit the right nail on the head. For the establishment of most noxious weeds, especially the Bathurst and Noogoora burrs, they were, in the first place unfortunately indebted to the Government. In the second place they were indebted to the divisional boards for their spread. At one time the reserves were in the hands of the Government, but after they were handed over in some form to the boards the latter did not seem to have as much control over them as to be induced to clear them of weeds. The result was they were left alone, and the weeds flourished and spread. The burr was carried about by cattle, and it had spread so much in some districts that they were one vast shrubbery of burr. Now, in many parts, it was becoming almost an impossibility to keep a paddock clear of the pest. It would be nonsense to compel a farmer to clear his land of the weed when Government reserves alongside were covered with it.

Mr. A. MACFARLANE (Rockhampton) said the Noogoora burr might not be known to many of the Northern and Central delegates, and as he came from the district where it was first propagated in Queensland, he would perhaps be allowed to say a little in the matter. The Noogoora burr took its name from the Noogoora Estate, about twelve miles from Ipswich. It was introduced on to that estate with some imported cotton seed. At one time a very small amount of money would have cleared the whole district of this pest. He was on the estate twenty-five years ago, after the cotton-growing had failed, and when the estate was being put under the hammer. Then one man could have cleared the whole of the Noogoora burr from off the place. But the estate was finally leased to a man who took in cattle on agistment, and between these cattle and floods, the pest was spread all over the country. It might be said that the authorities in the district were to blame; but in those days they had no Secretary for Agriculture, no Under Secretary, no Mr. Benson to identify such plants. That was the trouble. The burr was not looked upon as a danger. Of course a stitch in time would have saved nine, and if Mr. Benson had come along twenty years ago perhaps the country might never have heard of the Noogoora burr. It was only recently that Mr. Benson had discovered a tree in Rockhampton affected by a scaly wax that had hitherto been unknown in the district. The tree in question had been destroyed, and the district perhaps saved a scourge, and the same thing might have been done twenty years ago in connection with the Noogoora burr. Nut-grass was a great pest in some of the districts about Rockhampton, and he (Mr. Macfarlane) desired to know if there was any remedy for it. There were some farmers out at a place called Scrubby Creek, and harder-working farmers there were not in Queensland. These men, however, had assured him that nut-grass was likely to drive them out of the district. They had tried everything to get rid of it, but absolutely without success. As for the prickly-pear, he did not look upon it with any great degree of alarm. In many districts about Rockhampton

it was looked upon with friendly eyes by the small selector, and he could assure them it was not considered a scourge in all districts. He knew what it was like on the road between Dalby and Roma, where the country was given up to the prickly-pear, but it had been at Rockhampton for forty years, and had not spread. When he first went to Gracemere he was astonished at the Messrs. Archer Bros. allowing it to grow on the place, but those gentlemen told him it had been there forty years and had never given any trouble; in fact, they cultivated it. It was fed to cattle in winter, and he knew dairymen who would not be able to remain in the business but for prickly-pear. He knew farmers who fed pigs on it, and who looked upon it as a valuable fodder plant. He had heard that in some parts of South America and Mexico stockowners would be unable to see a drought through but for it, and he thought that in some of the Northern districts of Queensland the use of the pear would be the means of saving a lot of stock. Of course the spines had to be destroyed either by fire or by steaming.

Mr. O'KEEFE (Blenheim) came from a district that suffered severely from weeds, especially Noogoora burr. Farmers there were getting this latter into their cultivation paddocks, and to such crops as maize it was a terrible nuisance, although with lucerne it did not matter so much. Many people were inclined to blame the local authorities for their apathy in connection with weeds, and he was not going to defend them very much. When, however, they came to examine the authority the boards had to deal with these pests, it would be seen that they were not responsible for their spread. He maintained that the local authorities did not have the power to deal with the question, or to compel people to clean their property. Every authority felt itself in that position, although from time to time, from year to year, it went on going through the farce of calling upon people to clear their properties of noxious weeds. A board would send out notices threatening the land-owners with all the laws and penalties, but it stopped there because it felt that it could not move a step further. It dared not, and the ratepayers knew that. It had got that way now that in many cases those who were really anxious to clean their property omitted to do so because they knew it would simply be a loss of time for them to attempt to keep their land clean. It was useless one trying when others adjoining did not. He thought the want of power of local bodies to deal with the question should be brought before the Government, for he was certain that if once the boards felt they had the power they would take the matter up. Doubtless the boards would find it a tender question when the ratepayers' votes were considered. Then, again, there was the subject of the Government land. The moment the local authority had sufficient power to deal with the question the matter of public reserves would come in. He had been on a block of land on the Darling Downs 500 acres in extent, and, with the exception of a narrow bridle-path running through it, on the whole 500 acres there was not a spot where a man could drop a pin without its lighting on a prickly-pear. As for the Lockyer district, he had never seen prickly-pear spread in his own locality. [Mr. CHATAWAY: "It depends on the soil."] He hoped a resolution would be passed asking the Government to give local authorities more power to deal with this weed question. He thought it should be necessary that it be compulsory upon the local body to deal with it. People were always asking the Central Government to attend to little troublesome local nuisances, but all he (Mr. O'Keefe) thought they should ask the Government was to provide machinery for doing the work themselves.

Mr. WM. DEACON (Allora) said it was all right to say local bodies would not attend to noxious-weed eradication. But if they would not, why not replace the members of the body by men who would. When he (Mr. Deacon) was on a divisional board he always saw that the burr in the district was cut. If he did not cut it on his own land, he got a notice to do so; and if he still persisted in taking no action, the board would send a man to cut it for him, charging him with the cost. Again, every year his local authority called for tenders for the destruction of noxious weeds. On the Darling Downs every

effort should be made to eradicate the Noogoora burr, although his own municipality, he was glad to say, was free from both it and prickly-pear. With regard to the pear, he thought it had gone too far altogether, and they would have to give it up. Thanks to Providence, it would not flourish on black soil. It did best on poor land. Prickly-pear might serve as a fodder for cattle and pigs; but Heaven help the cattle and pigs that had to eat it. He did not think they would be able to make many porkers out of pigs that had been fed on prickly-pear for six months.

Mr. T. E. COULSON (Rosewood) stated that there was lantana growing in his district, and probably if it was not taken in hand in proper time it would eventually become a great nuisance. In fact, on the slope of the Range it was very troublesome at present, and he had lately had a lot of work in clearing a farm of it. Cutting was of no use for the lantana, the only way of dealing with it being to pull it out with a chain or grub it out. As for the prickly-pear, he had heard that it was a great fodder-plant, and he had kept it just as a stand-by for bad seasons. When he did have to try it, he boiled it; and although it kept pigs alive, he had never seen a pig fed on it with a twist in its tail. He might say, however, that cattle ate *Sida retusa* readily. He had had no experience of nut-grass or Noogoora burr.

Mr. M. MELLOR (Gympie) stated that municipal councils had not the power to compel people to eradicate noxious weeds, but divisional boards had. The latter had full power to make by-laws for that purpose. In his own district people were compelled to eradicate noxious weeds, and among these was the Noogoora burr. The Noogoora burr was as bad as a poison plant almost, for if cattle ate it they died. These noxious weeds were a matter of very serious moment, and he might mention that a resolution had been passed in the pastoral section recommending that a special fund be set apart for the destruction of noxious weeds on roads and Government lands. The destruction, to be of any utility, should be done by concerted action, as it was not much use one board doing it and another not. If it was made compulsory, the difficulty could be grappled with.

Mr. W. D. LAMB (Yangan) stated that the convolvulus gave every promise of becoming a terrible weed. It was spreading at an alarming rate, and he believed it was getting quite as bad in the West Moreton district as it was on the Downs. It climbed round the cornstalks, pulled them down and killed them. Convolvulus seed would evidently lie in the ground for years without injury to itself. A man could plough it in, and plough it in, and still it would keep. The Noogoora burr was on the Darling Downs, but not to an alarming extent, and he believed the authorities were trying to have it destroyed as much as possible. He believed divisional boards did have the power to compel land-holders to destroy noxious weeds on their properties, and the question had been tested on the Downs. If a man failed to keep his land clean, the local board could send men to cut the noxious weeds and charge the owner of the land with the cost of it. The trouble, however, was that the Act said the board may do that. What was wanted was an Act to compel the board to do so. As for burr on roads, he thought it should be cleared by the owners of the land adjoining the roads. As a matter of fact, he knew many farmers in his own division who did this voluntarily. He might mention the case of the Clifton and the Glengallan boards. A cleaner division, as regards weeds, than the Clifton could not be found in the whole colony, but in the Glengallan, which was alongside, there was very much room for improvement in that respect. He hoped the new Local Government Bill would be a comprehensive one, and would provide machinery for dealing with all noxious weeds, and would compel the boards to do their duty in making land-owners do theirs. In the present state of affairs one man might do all he could to keep his land clean of weeds while his next-door neighbour would do nothing. A heavy storm would come and bring seeds of all descriptions from the latter's farm to the former's, who then gave the thing up in disgust.

Mr. F. W. PEEK (Loganholme) believed in concerted action for the destruction of noxious weeds. These troubled the pastoralist equally as well as the agriculturist. The work birds did in distributing weeds about the colony through dropping seeds should not be lost sight of. With regard to weeds being spread from Crown lands and reserves, he would like to say that recently he knew the Tabragalba Division had advised the Agricultural Department of the presence of noxious weeds on certain Government land, and the Department promptly replied by asking the board to call for tenders, on its behalf, for the destruction of the weeds in question. This showed the Government was quite alive to its duty with regard to weeds on Government land, and had no objection to do its share of the work of eradication.

Mr. E. HORTON (Rockhampton) said that as for *Sida retusa* there were many of the settlers at Emu Park who looked upon it as a stand-by for cattle in winter. Prickly-pear, on the other hand, he considered a pest. On the Crocodile road he cleared a patch of prickly-pear a few weeks ago, gathered it up in heaps, piled trees round it, and set fire to the lot. He was out at the patch the other day, and the pear was up again and flourishing. Once on the other side of the Fitzroy there was no pear to be seen, but now it was scattered all over the district. Eight months ago he cleared a small allotment of prickly-pear, but now it was all covered again with this pest, for such he considered it, although he knew it was used by some as a fodder. He would like to know how to get properly rid of prickly-pear. As for nut-grass, he knew of no way of getting clear of it. Trenching the ground was good, and by that means he had got rid of it in a few patches. He had left the footpaths alone, however, and the nut-grass came through them. Lantana was now on the north side of the Fitzroy, and one piece of land had been cleared of it on several occasions. A creek, however, ran through the property in question, and this washed down fresh seed on to it. The lantana was brought into the Rockhampton district some twenty-eight years ago as a pretty flower, but it was now very extensively spread all over that district. There was no doubt that joint action was essential for the successful eradication of noxious weeds.

Mr. P. McLEAN said he had known a preparation called "Scrub Exterminator," manufactured by a Melbourne firm, prove very efficacious in the destruction of prickly-pear, provided the latter had not grown too strong.

Mr. HORTON said he had tried "Scrub Exterminator" for prickly-pear but the application, in his case, had not been successful.

Mr. W. R. ROBINSON (Toowoomba) had tried prickly-pear as a fodder, and had found it of very little value. People when feeding prickly-pear to stock often mixed a little bran with it, and it was probably this bran that kept the animal alive, the pear being not unlikely only more or less in the way. Both Mr. Macfarlane and Mr. Horton had said a good word for the prickly-pear and the *Sida retusa*, respectively; but he (Mr. Robinson) thought if the Rockhampton dairymen fed their cows on that sort of stuff they would never get much butter from them. The speaker also considered the divisional boards were largely to blame for the spread of Noogoora burr. He remembered once advising a board of the existence of a patch of this burr, and suggesting that it be destroyed. No notice was taken of the suggestion, and the result was that from that particular patch—which, by the way, was still in existence—the pest had spread over a large area of country in the neighbourhood.

Mr. J. E. NOAKES (Maryborough) said, in discussing the prickly-pear, it should be remembered there were two kinds, one having a large leaf. As for the *Sida retusa*, he remembered running it down to the late Mr. James Foote, of Ipswich. That gentleman, however, told him that in some dry seasons the *Sida retusa* kept the cattle alive about Ipswich, and since that time he had looked upon it as a farmer's friend. In any event, it could easily be got rid of, if the land was cultivated. As for lantana, it also could be regarded as a farmer's friend. It was a splendid manure, and for renovating worn-out land there was nothing to equal it. The lantana had a very good reputation on the Clarence River. It was not much use classing nut-grass as a noxious weed. It was impossible to

get rid of it, and perhaps it would be as well to accept it as a permanency. However, it did not do very well on red soil. He knew one man who did get rid of nut-grass, and that was by putting salt on the land. Unfortunately, however, the land, though it has grown no nut-grass since, has grown nothing else. As for the Noogoora and Bathurst burrs, neither of them seemed to have any friends; so they, along with the prickly-pear, would have to, if possible, go.

Mr. T. A. BROMILEY (Pialba) knew something of the lantana, and if he had to lay down a fallow he would prefer to put down lantana. He had bought a piece of property which had been overrun with lantana, some of the trunks of the trees being from 6 to 7 inches through. It took some trouble clearing, but that piece of land is the best he has now got. The lantana throws down a splendid mulch, and its manurial effect on land where it has been growing is very marked. Moreover, it is a fine thing for killing weeds, for nothing will grow where lantana is.

Mr. J. H. DAVIDSON (Wellington Point) desired to know the name of the prickly-pear which grew in the district, and which was used as a stock food. He knew there were two kinds of prickly-pear. The active ingredients in "Scrub Exterminator" were arsenic and caustic soda, and the preparation was very effective for destroying prickly-pear.

Mr. T. WHITELEY (Coowonga, Rockhampton) mixed a good deal among the farming community about Rockhampton, and could confidently say the farmers there would be very glad to get rid of both *Sida retusa* and prickly-pear. Where *Sida retusa* would grow, grass would; and there was not much question as to which was the most valuable of the two. There were two varieties of prickly-pear, and the chief kind about Rockhampton was the common or small-leaved variety. It spread at a great rate, if not checked. He considered it ridiculous to talk about feeding cattle on prickly-pear.

Mr. JOHN MAHON said his experience of *Sida retusa* was that it would taint the milk of cows fed upon it, and he would not advise any dairyman to use it. A good deal of the prickly-pear growing about Rockhampton was quite different to the variety growing on the Darling Downs and other districts in the Southern portion of the colony.

Mr. W. R. TWINE (Wallumbilla) said it had been stated that prickly-pear would not grow on black soil, but he would mention that about Jondaryan there was a very nice little patch of pear growing on very heavy soil, and he advised farmers not to let prickly-pear near their black soil, as he considered it would grow as well there as anywhere else. There were two kinds of prickly-pear in the colony, one of which grew to a great height, and which was quite different from the common, or a small-leaved, kind. As for the Noogoora burr, he had lately seen it at Roma, so that it was evident it was being spread—probably by cattle and sheep. As for the Bathurst burr, he took it the boards had power to make by-laws to compel land-owners to eradicate it. The *Sida retusa* was hardly known in the Maranoa and other Western districts at present. There was a *Sida* there, but he did not think it was the *retusa*. Another pest that had not yet been mentioned was the Johnson grass. It was all right, perhaps, for those who went in for grazing only, but it was a plant that once in a piece of land stayed there, and he would advise those who went in for cultivation to have nothing to do with it.

Mr. H. E. WYMAN (Ipswich), in replying, said that the powers given to divisional boards were all very well, but if a board would not frame a by-law there was no law to compel them to do so. What was wanted was an Act which would compel every board to take action in the matter of noxious weeds, and then there could be united effort for their eradication. The great object to be sought was the compulsory cleaning of roads and lands of noxious weeds.

The Hon. J. V. CHATAWAY said he would not take up too much of their time, as there were a lot of resolutions yet to be brought forward, but he thought they ought to thank Mr. Wyman for his paper and the very interesting discussion that had followed. He was glad to hear that the lantana had some

friends, because it was one of the easiest of things to eradicate, because it kept down weeds, and because it put back into the soil every bit of what it took out, and more. Of course it could not be removed from the land by being simply looked at and called a terrible pest, but otherwise its eradication was simple enough. As for prickly-pear, he might mention that he once managed the place in New South Wales where prickly-pear was first planted in Australia. It was twenty-four years ago when he was there, and on the place was an old lady who had been a nurse-girl there some sixty years before, and she told him of the care with which the original prickly-pear had been then attended to. Instructions were given her by the then owner of the place (Dr. Carlyle) to look specially after the strange plant which was going to make all their fortunes, the prickly-pear having been introduced with a view of cultivating on it the cochineal insect, although, as a matter of fact, it was discovered afterwards that the wrong kind had been obtained. When he (Mr. Chataway) took charge of the estate, already more than 1,000 acres of it were absolutely ruined through prickly-pear. In some paddocks there were not even the bridle-tracks mentioned by Mr. O'Keefe. There was just enough room for a few wild pigs to get into it. Every effort was made to get the pear under. Great pig-yards were erected, and immense boilers purchased. Horses were very cheap at the time—colts and fillies being obtainable at from 4s. to 10s. a head—and between 300 and 400 pigs were fed on boiled horses and prickly-pear. This, however, made very little impression on the pear, and, in any event, after seven or eight months' time the pigs would eat no more of it. He always remembered that when he heard people talk of feeding stock on prickly-pear. Another plan tried was to build immense piles of pear on a foundation of logs. The piles sank rapidly, and they were added to month after month by having more pear thrown on to them. The pear in the piles melted away, and was finally burnt. When burning, prickly-pear was extremely tempting to the smell, and he remembered at the time that many bullocks were badly singed trying to get at the burning mass. Even that was not the best way of dealing with the pear. The best way that he found was to take a narrow gully, log it across with timber, and throw the prickly-pear into it, and as the stuff sank keep on piling more on to it. In that way he had got rid of thousands and thousands of tons of pear, and even then when the land was cleared the work was not really done, the little spines coming up again in millions year after year. Twenty years afterwards he again visited the estate, and found that the prickly-pear had been finally banished from it; but it had been done at a cost of from £25 to £27 per acre. It was enough to frighten anyone. Prickly-pear was the most awful pest they could get on to their land; and if anyone thought that because he had the tall sort, or any other sort, it was not dangerous, he was making a very grievous mistake. Birds carried prickly-pear about in a most marvellous manner. Let them often look at a dead beast, and they would find thousands of seeds that had been dropped on it by crows from prickly-pear country.

RESOLUTIONS.

The following resolutions was then adopted:—

Proposed by Mr. C. MARKS (Kolan), and seconded by Mr. E. SWAYNE (Mackay)—

“That in the opinion of this Conference it is necessary that Parliament pass an Act providing for an efficient inspector of weighbridges, weighing-machines, weights and measures; also giving the vendors of agricultural produce, or associated bodies of the same, the power to appoint a check clerk or agent to check the weighing or analysis of their produce at the place of delivery to the buyer, or wherever its weight or value may be determined; and that the Government be requested to introduce such legislation next session as shall provide that all owners of weighbridges, weighing-machines, &c., shall

keep and maintain a complete set of standard weights to the full capacity of such weighing-machines, and that any properly appointed inspector shall have access to such weights for the purpose of testing such weighing-machines or weighbridges at such times as may be deemed necessary."

Proposed by Mr. T. WHITELEY (Rockhampton), and seconded by Mr. J. DAVIES (Rockhampton)—

"That in the opinion of this Conference market reserves should be proclaimed in all suitable centres of population, and same to be placed under the joint control of municipal and divisional board authorities."

Proposed by Mr. W. DEACON (Allora), and seconded by Mr. W. D. LAMB (Yangan)—

"That in the opinion of this Conference the railway freights charged in the colony for flour made from Queensland-grown wheat should be assimilated to or as low as those of New South Wales."

Proposed by Mr. H. EPPS (Childers), and seconded by Mr. S. A. LINDEMAN (Bundaberg)—

"This Conference considers it desirable that a tentative Act on the lines of the Marsupial Destruction Act should be brought before Parliament to deal with the sugar-cane beetle and grub, and that the Act might be so framed as to deal with any like pest from time to time on the recommendation of the Governor in Council."

Mr. E. DENMAN (Mackay) proposed, and Mr. W. DEACON (Allora) seconded—"That the resolutions carried at this Conference be handed to the Hon. J. V. Chataway for the purpose of being carried into effect."

A motion by Mr. P. HAGENBACH (Warwick)—"That in the opinion of this Conference it is desirable that a clause should be inserted in the new Local Government Act giving divisional boards the power to compel owners of land adjoining roads to cut and destroy Bathurst burr and other declared noxious weeds on such roads"—was lost.

CONCLUSION.

Mr. W. DEACON (Allora), in seconding the last motion carried, congratulated the Chairman on the able manner in which he had managed the Conference, and also upon the attendance at all the sittings. The business-like tact, courtesy, and ability which Mr. Chataway had displayed throughout the Conference could not be too much admired. (Applause.)

Mr. CHATAWAY thanked the delegates for their goodwill, and specially also for their regular and punctual attendance. It made it worth while to come to Rockhampton—to hold the Conference at a distance from the capital—when they saw such regular attendance. They would have an opportunity of saying farewell to each other on the following day, when he hoped that as many as possible would see their way to go down to Emu Park. He would then be able to inform them, too, about arrangements for visiting Lake's Creek on the Monday. (Applause.)

This concluded the Conference at 10.30 p.m.

DINNER AT EMU PARK.

On Saturday, the delegates, at the invitation of the Department of Agriculture, were present at a dinner at Emu Park. After the toast of the Queen had been honoured,

The Hon. J. V. CHATAWAY said: We are all here delegates to an Agricultural Conference, and I have a toast to propose—"The Health of the Officers of the Department of Agriculture"—although it scarcely, perhaps, comes with good grace from me. But you must remember that the Department goes on year after year, like a river, but the Minister is only a temporary exorcism who may do good or who may do harm. (Voices: "No, no!") That the Conference has been a success I think we may all feel assured, and we may

congratulate ourselves upon that success. Yesterday it was proposed that the next conference should be held in the North, but it will probably be a matter for very serious consideration whether it should be held outside of Brisbane. In other countries, when conferences are proposed, towns compete against towns for the honour of the conference being held in their midst. Business men realise that these assemblies of sixty or seventy people for several days in their town are of considerable value to the town. The utmost efforts are made in Great Britain and America to impress upon the delegates the importance of the district in which they are temporarily staying. The principal features of the district are brought before them, and opportunity is taken to advertise the resources of the place they happen to be in. As yet we have not arrived in Queensland at that stage. I need say no more than that, except I shall add this, because it will be a hint to other towns: When it was decided to hold this Conference here, we could get no roof, except at exorbitant rates, to shelter us. I say this, so that when other towns propose conferences which cause delegates to spend a very great deal of money, they should know what we think. There are features in this district which, as head of the Department, I was extremely anxious that you should have all seen. One of the brightest spots is an institution which has long struggled manfully against adversity into success—namely, the Lake's Creek Meatworks. Delegates have asked me whether they could see these works, and I now have to tell them that, as a body, they are not at liberty to do so. The manager is willing that six and not more delegates can visit those works. There are other interesting features in the Rockhampton district that I have visited. There are the Botanic Gardens, which are a credit to the town. When you have discovered where they are, I hope you also will visit them. Time is short, and I have nothing more to say. Probably I have made myself perfectly clear, and I now ask you to drink the health and long continuance of the Department of Agriculture and its officers here present.

The toast having been drunk with musical honours,

Mr. P. McLEAN, in response, said that as a Civil servant, he ought, perhaps, to feel himself in the position of those who, in old times, knew that if they spoke their minds they would have their heads cut off, but he was happy to say that he had no fear that day in that respect. He had been most highly gratified at the success of the Conference. The debating power of the delegates was quite up to anything they had had before, and a special feature had been the way delegates had attended the sittings and stuck to their work. He had had a good deal of experience of conferences generally, and too often it was found that delegates had friends here and friends there whom they had to visit. There was certainly a good deal of work in getting up these agricultural conferences, but when one knew how the work was done, there was not much difficulty in it. He was only too pleased to do what he could to ensure the success of the gatherings, and when he had finished his duty he threw the rest of the responsibility upon the shoulders of the delegates. They had worked harmoniously, and, without rubbing themselves down too much, they could congratulate themselves on a most successful Conference. Looking back ten years, he remembered when the Agricultural Department existed in two little rooms in the Lands Office, and he had so much to do that he was able to read all the reports and newspapers that came addressed to him. They would be able to understand something of the expansion that had taken place since then when he told them that the Department was now occupying a large three-story building, that tenders had just been called for adding to that building another eighteen rooms, everyone of which was occupied before it was built, and that he had long since been forced to give up personally reading all but a fraction of the reports and newspapers that were sent to him. As long as he had anything to do with the Department it would be his object to advance the interests of the colony generally, while specially devoting his attention to the agricultural industry.

Mr. P. R. GORDON thought he might claim the credit of being a hard worker, but he was never a public speaker. He had also to remember that at these gatherings there was a "chiel amang them takin' notes," as he was reminded when a gentleman told him the previous day that he had been indiscreet in referring to their chairman as a sympathetic Minister. He would, therefore, simply quote the words of Bobbie Burns, and say, "You have been kind, and I am grateful."

Messrs. A. H. BENSON and JOHN MAHON also replied in response to calls.

Mr. W. R. ROBINSON (Toowoomba) proposed the health of their Chairman, and in doing so expressed his high opinion of the character and ability of that gentleman. He was the right man in the right place, a man who had rubbed shoulders with the world and knew how to manage men and things. That there was no doubt of this was evident from the way he had handled them at the Conference. With regard to another conference, he had understood Mr. Chataway to say that they presumed it was going to be an annual gathering. He hoped it was. He had proposed on the previous day that the next Conference be held at Toowoomba, and, if it were, he could promise a good hall as well as a fine display of the agricultural products of the district. Perhaps after all, however, the College would be the right place in which to hold it. In any event he hoped the conferences would be annual affairs, as they did an immense amount of good.

The toast having been honoured,

Mr. CHATAWAY returned thanks, and said he did not wish to be misunderstood. He had spoken as he had, mainly because he had felt it was his duty to consider the delegates for the time being as his children. These conferences were held not only for the instruction that was obtained at the meetings themselves, but also for the instruction that was gained in visiting a strange place. But if no more instruction in this latter respect was gained than had hitherto been the case, the expense delegates had been put to in coming from all parts of the colony would not perhaps be warranted. Mr. Gordon had been weak enough to say that they had a sympathetic Minister. He certainly did sympathise with the delegates, though not perhaps with all their resolutions. Before sitting down he desired to propose the health of those gentlemen who had given up a day to join them in their present excursion, and with the toast of "The Visitors" he would couple the name of Mr. M. C. Thomson.

Mr. M. C. THOMSON, in response, thought he could put them on the right track as to the distribution of produce on the other side of the world. He had heard that the middleman had had a very rough time of it at the Conference. He was a middleman, and he would explain why he had become one. In the first place he became a middleman because he was a producer. He was one of those unfortunates whose cattle were tied up through tick regulations—regulations which should never have existed. Some years ago he was connected with the management of the Lake's Creek Meat Company, and he was sent to England to see why frozen meat had gone down in price, and also to get behind, if possible, the middleman. In making this journey he went *viâ* the United States, and in this latter country saw that the difficulties Queensland experienced in producing its raw material in a proper form hardly existed in America. In short, the Americans understood their business, while the Queenslanders did not. He then went to London to find the butchers' ring that was said to exist there, but was unsuccessful. As a matter of fact it was absolutely impossible to conceive a butchers' ring existing in London. There were over 600 wholesale butchers who had stalls at Smithfield, besides which there were between 5,000 and 6,000 butchers in London, and to think of the Smithfield men forming themselves into a ring required a very big imagination. He had always found it well-nigh impossible to get even half-a-dozen men to combine. At least, that had always been his experience with pastoralists. When he had been a producer only, he used to think the middlemen got far too much out of the profits, so he decided to join them, and he had now been in partnership with the

middlemen for the past three years. When he was in London he got into touch with the agents of the Lake's Creek Company, and with them formed a company now called the Colonial Consignment Distributing Company. The idea of this company was that it should distribute meat all over England, and not confine its energies to any one place. He had taken a hand in forming the company, and when doing so had been very strong on the fact that London was not the best distributing centre for England. It was too far south, and was not situated among the people who were likely to be the largest consumers of Australian meat. The company had already purchased an establishment in London, so it was decided to have a second distributing centre, and Manchester was the town fixed upon. There was now a canal to Manchester, and ships would soon be able to go right into the city, within a radius of thirty miles of which there were ten millions of people. The River Plate people had made Liverpool their headquarters, but his company had gone ahead of that. His company was very ambitious to get into big things and do big things, and it was prepared to take all the producers of Australia into partnership with it. The company was a co-operative affair, the co-operation being to this extent: After it had paid, out of the profits, dividends on the shares up to a certain agreed percentage, any surplus profit above that percentage would be divided among the consignees of produce in Australia. There was another point he would like to speak about, and that was the grading of meat. A good deal of discussion was going on about this subject, and it was one the importance of which could not be overrated. If a man sent a mixed lot of cattle to market, the price of the lot would, in all probability, be fixed by the value of the worst, and it was the same with meat. In England the carcasses were graded very carefully, and buyers bought according to the quality of the meat shown in the stalls at Smithfield. In short, it was sold according to sample. Something had been said about the branding of meat; and although the Government might be able to brand boxes of butter with advantage, he did not see how they could do so with meat. It was discussed in London, and the question was inquired into by a Royal Commission; and from all he could learn there was no feasible scheme by which a man could put a brand upon a sheep carcass that would be of the slightest use. If it was done, the sheep would have to be branded all over, for the reason that it was all cut up into a dozen different parts before going into consumption. In any event, meat was sold entirely on its merits. Wool was the same way. The Government did not interfere with the branding of wool, the growers sending home the wool with their own brands on. If a man had the right sort of cattle his brand on the meat would soon become known, and buyers would ask for such-and-such a brand. As for butter, and extract of meat also, they were in London entirely sold by their flavour. The buyers in London were very keen, and he would have to be a smart man who could take his place among the smart men of London. They had the best men there at every game. As he had said before, a Smithfield butcher bought a thing on its merits, and if Australian producers would take his (Mr. Thomson's) advice they would only send home the very best quality, and grade it at that. (Applause.)

The gathering then broke up, and returned to town.

The majority of the delegates left for their respective homes on Monday afternoon, the 16th May, many of them having spent the interval between that day and Saturday in visiting Mount Morgan, Gracemere, the Gindie Experiment Farm, and other places of interest in the district.

Agriculture.

THE QUEENSLAND AGRICULTURAL COLLEGE.

ON the completion of the last college term (13th July), Professor E. M. Shelton, Principal of the College, resigned that position. A successor to carry on the work so ably initiated by Mr. Shelton has been found in Mr. John Mahon, late Instructor in Dairying to the Department of Agriculture. The secretarial work has been placed under the charge of Major A. J. Boyd, Editor of the *Queensland Agricultural Journal*. Mr. Boyd will still retain the editorship of the *Journal*. Mr. Mahon, as Principal, should prove a fit man for the position. He is well known throughout the Australian Colonies as an able agriculturist, and one of the most scientific experts in dairy work in Australasia. Major Boyd is an old agriculturist, orchardist, and sugar planter, and has also had much experience in scholastic work, and in the management of grammar schools in Queensland. The College staff will remain unchanged; thus no sudden changes will be made in the general curriculum as initiated by Professor Shelton, and the work will continue to be carried on on the same lines as heretofore.

Much regret is expressed at the retirement of Mr. Shelton, who has done yeoman service to the farmers of Queensland for over nine years.

OPENING OF THE SECOND TERM.

The Minister for Agriculture (Hon. J. V. Chataway) returned on the 14th July from a brief visit to the Queensland Agricultural College at Gatton. The visit was prompted by the fact that on the previous day the institution was reopened, after vacation, for the second term, and under the new joint management of Messrs. Mahon and Boyd. The Minister found everything ready for a start, with a good muster of students. The term opens with thirty pupils, six of the number being new ones, the remainder "old boys." They accorded the Minister a fitting welcome, and were addressed by Mr. Chataway in the lecture-room.

Mr. CHATAWAY said he had an unpleasant matter to allude to, and, being unpleasant, he would say it first. The later days of the term which ended in the middle of May had been disgraced by an outbreak which he hoped would never be repeated. The attendance this term was smaller in consequence of that outbreak, about which painful subject he need only say that any exhibition of rowdyism or any deliberate infraction of the rules must, in order that the good name of the College and of the students might be preserved, be met with punishment. It might be possible that the most guilty had escaped detection. If they had done, he hoped they would bear in mind the escape they had had, and be models of good conduct in the future. Since last term, as they knew, Mr. Shelton had resigned his position as principal. To him had been largely due the general plan of the College. He was enthusiastic about it, and had worked hard for its success. He knew that there were many of them who would deeply regret his departure. A new Principal, Mr. Mahon, had, however, been installed in his place. Under him he (Mr. Chataway) felt sure they would make progress. He would, he thought, impress them, as he had impressed others he had come in contact with during his ten years' residence in Queensland, with the fact that what he talked about he understood. Mr. Mahon had captured the hearts of the grown-up farmers, and he would to a certainty capture theirs. Most of them, he hoped, would some day be farmers. He (the Minister) had read only this week the report of a certain large college in America (the Michigan Agricultural College), and he saw that there 24 per

cent. of their graduates became farmers—that was, that out of every 100 who passed through the whole collegiate course seventy-six did not take to farming. He hoped that the results in Queensland would be more satisfactory. They hoped to instil into the students such a love of the practical work of the farm that in after life quite half of them would take up agriculture as a profession; but, whether they took up agriculture or not, he felt sure that the knowledge they would gain at the College would be no burden to carry. He had received a petition wherein the students complained of certain arrangements of work. That petition ought to have been sent to the Principal, and if he, after consultation with the masters, was unable either to redress their grievances or to show that there were, in his eyes, insuperable objections to any alteration of the existing system, they should then, and then only, have addressed themselves to the Minister. However, every effort would be made to put things on a more satisfactory footing. He impressed upon the students the fact that the training they were to receive would be of a practical nature. At the end of the term he would award a prize for the best diary. As indicating the lines on which the diary might be written, he remarked that in all operations carried on Mr. Mahon would fully explain what was being done. If Mr. Mahon had fat cattle to sell, it would be explained why one beast was selected in preference to another. They would be told what prices were obtained for them. The dairy cattle would be tested for tuberculosis with the tuberculin test; they would, therefore, see this, and if any of the cattle should unfortunately show reaction they would learn what reaction meant. A veterinary surgeon would be sent up to make a *post-mortem*, with the students as spectators. A few sheep would be added to the stock in order that they might know where to look for the heaviest and best wool. The diary he asked them to keep would relate to such things as he had mentioned, as well as their general work on the farm. Concluding, Mr. Chataway mentioned that he would like all of them who had been accustomed to attend church to continue to do so; that he would obtain, as soon as he could, such a conveyance as would take them to their place of worship, so that no one could say they were kept from their religious exercises through difficulty in reaching the place where services were held.

At an earlier period of the day Mr. MAHON also addressed the students. At the outset he mentioned the changes made in the management since the vacation, consequent upon the resignation of Professor Shelton (for whom he had much esteem), and the appointment of himself. He further expressed the pleasure it gave him to see so many healthy and manly-looking young men around him. He hoped they were all fully prepared and anxious to fulfil their part as farmers in building up agriculture in Queensland—a science every country depended on, and without which no country could prosper. Their parents had placed them at the College to enable them to receive a practical and scientific training in all branches of agriculture, so that they might be in a position to earn an independent living as farmers, than which, to his mind, there was no higher calling. So far as the masters of the College were concerned, they would do their best to fulfil their part, and it would be for the students to reciprocate their efforts, and justify the trust that had been placed in them by their parents and guardians. It was his great ambition while in charge of the College to so educate them that no single one of them could be pointed out as a discredit in conduct or education to the institution, to the masters who had devoted time, patience, and learning to their education, or to himself as Principal. He wanted to impress upon them that a farmer's life was not necessarily, or indeed would not be, the uninteresting and almost slavish life that it was often held up to be by those who knew least about it. At the same time, he did not want them to think that a farmer's life, or a student's life there, was an idle one. They would have their hours of work and hours of play; but during the former time they would have to put forth their best endeavours. In conclusion, he appealed to their honour, to their good sense,

to be true to discipline, to respect their teachers, and respect themselves as young Queenslanders should do. These latter remarks more especially referred to the older students, who by their example and precept could do much to mould those of their younger fellows for good or for evil. If they had a grievance, let them submit it in a proper manner, and it would have every consideration and fair judgment from the masters and himself, and if it was of too weighty a nature for them to decide it would be laid before the Minister without fear or favour to either side.

THE SWEET POTATO.

WHY should we not have a supply of sweet potatoes all the year round? Because the crop ripens in the fall, and is cleared off the ground long before planting time comes round again, say in September. But it does not follow that because sweet potatoes are not planted until the spring that therefore none should be available until the following autumn. We rarely hear of any attempt being made to keep a crop either for a rise or for home use. As soon as the crop is ready to cut or dig it is a race with farmers to get it to market, no matter what price is obtainable. If the question of storage were better understood, farmers might realise big profits instead of sustaining actual losses by this rushing into the market. In the case of sweet potatoes some will say they cannot be kept for any length of time; but this is a mistake. They can be and have been stored for months, both in this colony and elsewhere, merely by the use of dry sand, and we find that the same method is adopted in the United States by sweet potato-growers with eminent success. The main secret lies in not digging the potatoes till they are fully ripe, and, secondly, in guarding against bruising by rough handling.

We have already given directions for storing sweet potatoes in Vol. II., Part 2, of the *Journal*, and we also explained how to tell when the tubers are ripe; so we will merely add the testimony of the *Florida Agriculturist*. That journal says:—

Plant more sweet potatoes. A man should consider well before leaving a country which produces successfully the cornfield pea and the sweet potato. Seventy-five to 100 bushels of potatoes can be grown upon sandy land which will produce only 15 or 20 bushels of corn. Besides the desirable qualities of the potato as a food for man, it is eaten with avidity by every species of stock.

There is but one difficulty in the way of the more extended cultivation of this crop. Many experience difficulty in keeping it through the winter. If they are not dug until ripe, and are handled without bruising, the chief causes of failure will be removed.

When the potato is ripe, the sap has reached what may with some propriety be termed the crystallisable stage—*i.e.*, when the root is cut or broken and exposed to the air, a white crust or artificial skin is formed over the cut part and protects it from the air and from the agencies of decay. If it is not ripe, the cut part turns black and no such artificial skin is formed. If, therefore, proper judgment is exercised as to the time and manner of digging, handling, and storing, the danger of loss is reduced to a minimum.

One of the most common causes of rot is the entrance of mice into the bank. These little rogues gnaw the roots, and the chips which they make start a fermentation which rapidly spreads through the mass. This may be prevented by protecting the roots with hardware cloth.

The most successful potato-growers build houses in which to store the potatoes. These are usually constructed of poles, which are notched up closely at the corners and the cracks daubed with clay. Dry sand is collected in summer and stored ready for use amongst the roots when they are dug. The same sand may be used annually for an indefinite period. We know one house

in Middle Georgia in which the old potatoes were kept until the new crop came in every year for forty years. There are potato-growers in Cobb and Gwinnett counties in Georgia who have made a decided financial success of this crop. They plant largely, store successfully, and hold their crops until the latter part of winter and early spring, when they readily realise a dollar per bushel.

PANICUM IN THE BUNDABERG DISTRICT.

By J. W. FAWCETT.

In the May number of the *Queensland Agricultural Journal* Mr. Henry A. Tardent, the Manager of the Westbrook Experiment Farm, in his paper on "Those Summer Crops," gave a few particulars regarding the cultivation of Panicum.

The reading of his article brought to my mind some facts relating to this millet which fell under my observation in the Bundaberg district last year (1897). As they may probably prove interesting, beneficial, or useful to readers of this *Journal*, I append them herewith. The Panicum in question was grown in the far-famed (sugar) district of Woongarra by Mr. J. Smith, of Cragandoran, Barolin.

A.

Country—Forest ; outskirts of Woongarra Scrub.

Soil—Red chocolate, from 3 to 4 feet deep.

Subsoil—Yellow clay.

Preparation of Soil—Ploughed twice and harrowed ; well worked.

Previous Crop—None. Newly broken ground.

When Sown—2nd August, 1897.

How Sown—Broadcast.

Quantity Sown per Acre—15 lb.

Subsequent Preparation of Land—Harrowed once with light harrows, and then rolled with heavy roller.

When Cut, &c.—Second week in November, 1897, after thirteen weeks' growth. It was then fully ripe, of a golden-yellow colour, and had the appearance of a field of ripe wheat. After being cut with the scythe it was bound up (when dry) into sheaves, and then stooked. After standing for two or three days in this manner, it was stacked in round ricks.

Yield per Acre—4 tons.

The stems were from 5 to 6 feet in height ; and the length of the heads varied from 5 to 7 and 8 inches. In general it stooled well, as many as eighteen, twenty, and twenty-five stems being on one stool.

It had dry weather for about a month after it came up, after which there were some slight showers.

For a second crop the ground was simply harrowed and rolled. It came away very well, but the heavy rains in January, 1898, washed a great deal of it down, consequently the second cutting only averaged about $1\frac{1}{2}$ tons per acre.

B.

Country—Forest ; a portion of Barolin Plains.

Soil—Black, but only about 6 inches deep.

Subsoil—Yellow clay.

Preparation of Soil—Ploughed once and harrowed.

Previous Crop—Sugar cane.

When Sown—8th and 9th August, 1897.

How Sown—Broadcast.

Quantity Sown per Acre—15 lb.

Subsequent Preparation of Land—Harrowed and rolled.

When Cut—Third week in November. This portion was not so tall as that of A, but had more leafage. It was cut, sheaved, stooked, and stacked in the same manner as A.

Yield per Acre—2 tons. The second crop was eaten down.

My knowledge of *Panicum*, based on experience both in North and South Queensland, is that it is one of the most valuable of fodder plants, being equally as much so in cool, moist districts, or in dry, hot ones. The abundance of green herbage it yields is remarkable, and no farm should be without a patch of it. As a green "stuff" it is an excellent "feed" for horses and cattle, and especially young stock. As chaff it is unsurpassed as horsefeed. The small seeds are also excellent food for fowls, and I have known laying fowls fed on it become prolific layers.

SILOS.

THE great interest taken in the ensilage question by our farmers and graziers makes it incumbent on us to place before them all information at our disposal on the subject. In America the construction of silos has taken firm hold of the farmers of the United States. Mr. F. H. King, of the Agricultural Experiment Station of the Wisconsin University, gives the following practical remarks in a bulletin issued by that institution:—

In storing a portion of the coarse feed for farm animals, the silo has many advantages over the ordinary methods. Not all coarse fodder should be made into silage, but a large share of it should be, especially on a dairy farm.

Fresh, green herbage is the natural and best rough feed for cattle, sheep, and horses. Silage comes closer to this feed than any other. Besides being much cheaper than roots, it is a better general feed for cows, because it contains the rough fodder in addition to the succulence of roots.

Silage deteriorates very slowly with age, if at all, after the first necessary losses have occurred, and may be fed when several years old; while dry fodders, even in dry climates and under the best of conditions, do lose in feeding value continuously with age until they may have lost 50 per cent. or more of their food value.

Both clover and corn can be made into silage, and fed more cheaply than as hay or corn fodder.

The storage space required for silage, per ton of dry matter, is only about one-third that required for hay.

A silo makes it possible to keep a larger number of cows on a given area of land than is possible in any other way where rough feed is not purchased.

The term "rough feed" is used to designate all kinds of dry forage, such as mealie stalks, hay, and silage, in contradistinction to grain, meal, or oil-cake.

PUTTING THE SILAGE IN WHOLE OR CUT

Corn and clover may be put into the silo either whole or cut, as seems best under the circumstances. In either case good silage can be made if proper care is taken, but more care and usually more time will be required to fill a silo with either whole corn or clover than to run it through the cutter first; and it is certain that more time will be required to take the silage out of the silo if put in whole. Great care must be exercised in putting materials into the silo whole to see that close packing is secured about the sides and especially in the corners of the silo, if rectangular in shape.

DEPTH OF SILAGE IMPORTANT IN REDUCING NECESSARY LOSS.

The depth of silage in the silo is the chief factor which determines the closeness with which it is packed, and consequently the completeness with which entangled air is expelled and outside air prevented from working downward from the top or towards the centre from the walls in case there should be any leak there.

To insure the best silage and the least loss of dry matter, it is important that the silage should have a depth at the close of filling of not less than 24 feet, and 30 feet is better than 24 feet. Under these conditions the silage is so compact in its lower two-thirds that even if the walls are a little open the silage is so close and is pressed so hard against the walls that air would enter it much slower than if the pressure were less. Where the silo stands until spring before it is opened, the necessary losses in the upper 4 to 6 feet of silage may reach 20 to 24 per cent. of the dry matter put in, and this may be true also even when only the upper 12 inches appears decayed or mouldy.

THE COVERING OF SILAGE.

Where silage is to stand any length of time before feeding begins, it is important that its surface should be in some manner protected from the air. Green marsh hay cut, if it is available, makes an excellent cover. Oat chaff, or a portion of the silage itself, may be converted into a cover if nothing better is available which is cheaper.

The first thing to do after the silo is filled is to see that its surface is tramped very thoroughly and systematically every two or three days for a period of at least ten days. If some material for cover cheaper than the silage is to be used, it should be put on at once and thoroughly wetted with water at the rate of 15 to 20 lb. per square foot of surface. If nothing is put on, then the silage itself should receive a similar wetting.

The object of the repeated trappings is to overcome the tendency of the settling of the silage and its dragging on the sides to make it open and loose so that air may enter deeply. It is especially important to tramp close to the walls where the settling is most hindered by the friction.

The object of the water is to restore that which is lost by evaporation due to heating, and to develop quickly a thin, well-rotted, very wet layer on the surface which then becomes a nearly air-tight cover for the silage.

The loss where water is used and no cover, other than a layer of decayed silage, we have found to be about 16.5 lb. per square foot of surface where the silo has stood eighty days, and 22 lb. where the silo has stood 180 days before being opened.

THE WEIGHT OF SILAGE PER CUBIC FOOT.

The weight of corn silage increases with the depth below the surface, with the amount of water in the silage, and with the diameter of the silo. In silos of small diameters the amount of surface in the wall is so much greater in proportion to the silage contained that the friction on the sides has more influence in preventing the settling of the silage.

THE CAPACITY OF SILOS.

The capacities of silos increase more rapidly than do their depths, so much that a silo 36 feet deep will contain nearly five times as much silage as one only one-third that depth; and when it is remembered that there is less necessary loss with deep silage the importance of depth will be appreciated.

Doubling the diameter of the silo increases its capacity a little more than four times, while trebling its diameter increases its capacity nine-fold. It is evident, therefore, that the cost of storage decreases rapidly with increase in the size of the silo.

IMPORTANCE OF FEEDING FROM THE TOP.

Silage spoils more rapidly when fed from the sides than when fed from the top. Cutting down and feeding in sections results in greater loss than in feeding from the side, so that where deep silos are impracticable the only other plan is to use several silos or, what amounts to the same thing, dividing a single silo into pits with partitions. Partitions, however, are objectionable, and should be resorted to only where it is impossible to store a sufficient amount of silage for the year without making the feeding surface so broad as to cause the silage to be fed down too slowly to prevent its moulding on the surface.

TABLE giving INSIDE DIMENSIONS of SILOS which will allow the SILAGE to be FED DOWN at a MEAN RATE of about 2 or 3 inches daily, assuming 40 lb of SILAGE at time of filling, to be fed to each cow daily. Capacity of each silo sufficient for 180 days.

No. of Cows.	SILO 30 FEET DEEP WITHOUT PARTITION.					SILO 24 FEET DEEP WITH PARTITION.				
	Contents.		Round diameter in feet.	Square sides in feet.	Mean depth fed daily.	Contents.		Round diameter in feet.	Square sides in feet.	Mean depth fed daily.
	Tons.	Cubic ft.				Tons.	Cubic ft.			
30	108	4,091	15	12 x 14	2 inches.	108	5,510	17	16 x 16	3·2
40	144	6,545	16·75	14 x 16	2	144	7,347	20	18 x 18	3·2
50	180	8,182	18·75	16 x 18	2	180	9,184	22	20 x 20	3·2
60	216	9,818	20·5	18 x 18	2	216	11,020	24	22 x 22	3·2
70	252	11,454	22	20 x 20	2	252	12,857	26	22 x 26	3·2
80	288	13,091	23·5	20 x 22	2	288	14,691	28	24 x 26	3·2
90	324	14,727	25	22 x 24	2	324	16,531	29·75	26 x 28	3·2
100	360	16,364	26·5	24 x 24	2	360	18,367	31·25	28 x 28	3·2

SILAGE FOR SUMMER FEEDING.

As methods of farming become more and more extensive, farmers will come to use silage as a part ration during the whole year. The silo must ultimately supplant the pasture, except as a place for airing and exercise, and no other method of soiling can prove as economical as the silo when properly constructed and handled.

If silage is fed every day in the year from a single filling, either more than one silo must be used or else the depth of the silo must be increased to about 40 feet, and in this case the rate of feeding could not exceed an average of 1·4 inches per day. Still it is my judgment that this rate of feeding is preferable to having two silos, for I have shown that the loss from spoiled silage at the surface after 180 days, when this is used as cover, is 22 lb. per square foot or 5·1-3 tons for a silo 25 feet in diameter.

TABLE giving the INSIDE DIMENSIONS of SILOS which will allow CORN SILAGE to be FED DOWN at the MEAN RATE of 1·6 inches per day, allowing 35 lb. of SILAGE daily per cow for 258 days; the depth of the SILO being 34 feet.

						Round Feet.	Square Feet.
For 20 cows, diameter of silo	...	...	...	...	...	12·75	11·5
For 30 cows, diameter of silo	...	...	...	...	...	15·6	13
For 40 cows, diameter of silo	...	...	...	...	...	18	16
For 50 cows, diameter of silo	...	...	...	...	...	20·1	17·9
For 60 cows, diameter of silo	...	...	...	...	...	22	19·5
For 70 cows, diameter of silo	...	...	...	...	...	23·9	21·1
For 80 cows, diameter of silo	...	...	...	...	...	25·5	22·5
For 90 cows, diameter of silo	...	...	...	...	...	27	23·9
For 100 cows, diameter of silo	...	...	...	...	...	28·5	25·25

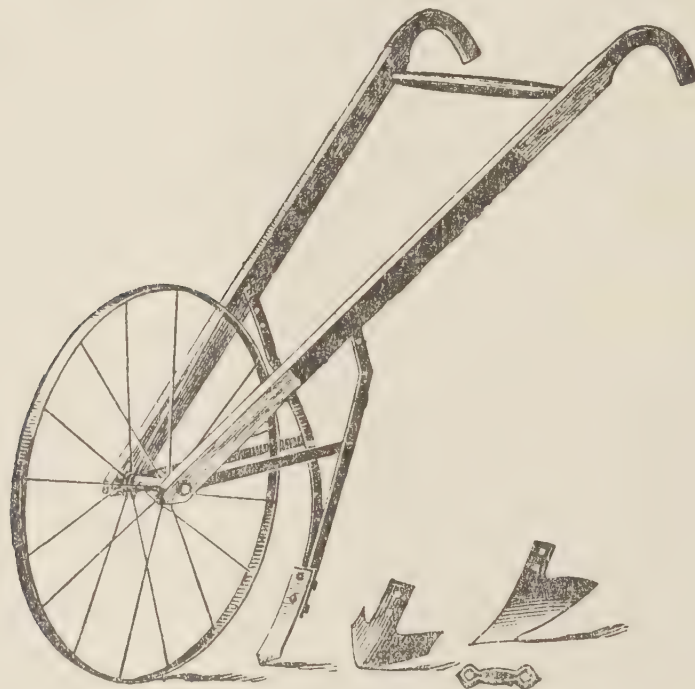
A LABOUR-SAVING TOOL.

By PHILIP MAC MAHON,
Curator, Botanic Gardens.

IN every operation nowadays, from the sinking of a squadron to the hoeing of a cabbage plot, two things make for success. These are machinery and organisation; and the man, be his position what it may, who fancies that he can afford to neglect either, will certainly get "left." If he is owner or manager, his business will leave him; if he is a worker, he will leave his business.

There is amongst those who work for hire in horticultural establishments, the same unreasoning objection to the introduction of machinery for performing work heretofore done by hand labour which characterised the introduction of machinery into the textile and other trades. Jack finds that by the use of a machine as much work can be done as he and Tom had been accustomed to do between them; and he argues, and with some show of reason, that this means that there will be no work for one of them, and that one may be himself. But he forgets that the increased output and profit (whether in money or pleasure) of the concern only creates a demand for more; and so far from either of their services being dispensed with, the great probability is that it will be necessary to call in Bill to help them.

No garden should be without one of the garden ploughs illustrated on this page. It is called "Avery's New Garden Plough," and it comes from America, and may be procured through any agent for agricultural machinery. Two are



in use here, and after a careful test the conclusion is arrived at that at certain classes of work of the most imperative necessity in every well-regulated garden one man can do the work of at least four with one of these simple and inexpensive tools.

As will be seen from the illustration, it consists of a steel wheel which is 2 feet in diameter, and, being made on the same principle as a bicycle wheel, is very light and of great strength, and well adapted for travelling amongst plants or between rows of vegetables planted closely. To this wheel are attached two light wooden handles. To these are attached two light iron rods which meet below, and carry a sweep (hoe) of any width up to 12 inches, a plough, tine, rake, or any cultivating appliance which it may be decided to affix. The whole thing is simplicity itself, and is a marvel of strength. With a sweep 7 inches wide, and with the expenditure of a minimum of labour, one of these machines cut up a thickly matted grass covering from a gravelled path here which could not have been removed by any ordinary hoe, but would otherwise have to be tediously cleaned off by chipping mattocks. It was tried here in the presence of Mr. W. S. Campbell, of the New South Wales Agricultural Department, who declared that he had never seen such an efficient garden tool. It was tried for hilling up, and did its work admirably. It can be adjusted to suit the height of any person or for any operation. The cost of those at the Botanic Gardens was £1 5s. each, with tine, rake, plough, and sweep; an additional broad sweep costs a few shillings more. It can be used by a youth, and will save its own cost in a week.

PURCHASE OF CANE BY DENSITY.

By R. DUPONT.

(TRANSLATED BY A. J. BOYD.)

THE March number of the *Revue Agricole*, published in the Mauritius, contains a remarkable article on the use of the saccharometer in the purchase of cane by sugar manufacturers. Although we do not endorse the ideas of Mr. R. Dupont, still, as a highly certificated chemist, holding the diploma of the Ecole Nationale de Grignon, we think that his ideas are entitled to consideration by all who are interested in the purchase and sale of sugar-cane. Mr. Dupont's address is as follows:—

For several years planters have exhibited a great tendency to reduce their plantations and to fill the requirements of their mills by purchasing from the small growers. They have, as you know, the bad habit of establishing a uniform price for the raw material, irrespective of the variety of canes which they purchase, or of the then state of the market. They aim at co-operation with their neighbours, without considering the more than advantageous situation in which they place the small planters, who, as a rule, are not bound by contract, and who are naturally anxious to sell their cane at a price above its real value. But there is such a divergence between the saccharine content of different varieties of cane, and also between that of canes of the same variety cut at different times, that one is constrained to ask oneself if the interests of the planters are not often injured in consequence of a bargain made at a bad time of the year.

Thus it is not an uncommon circumstance for sugar manufacturers to pay 5 rs. per 500 kilos (equal to about 15s. per ton) for cane during the month of August, when scarcely any cane has arrived at maturity. The Port McKay, for example, at this season of the year contains only about 11 per cent. of sugar, and in rainy seasons even 10 and 9.50 per cent. Of this 11 per cent. the manufacturer can reckon on about 7.25 of marketable sugar, and from canes yielding 9.50 per cent. the return barely exceeds 6.25 per cent. Reckoning the price of sugar at 8 rs. per 100 lb., the respective return is 5.80 rs. and 5.00 rs. per 1,000 lb. of cane, from which must be deducted about 1.20 rs. on account of cost of manufacture.

On the other hand, there are occasions when the manufacturer may make a large profit, when, for instance, they purchase the Lousier cane at full maturity. This variety gives ordinarily a percentage of 15.50, and even of 16.00, of saccharine matter towards the end of November in our district. When the manufacturers pay, as above shown, 5 rs. per 1,000 lb. of cane, and this cane produces 10.50 per cent. of its weight in sugar, which at 8 rs. per 100 lb. gives 8.40 rs. as the result of the 1,000 lb., it is clear that a handsome profit must be made over and above the cost of production. But it is important to notice that transactions between the small proprietors and the manufacturers are rare at this time of the year, because, as a rule, the former, being in need of money owing to their precarious circumstances, apply to the latter as early as possible and long before their crop has matured. On the other hand, the small growers, not having always at their disposal a large quantity of fertilisers, and cultivating as they do at a minimum expense, prefer to accelerate the date of harvesting in order to get their ratoons as much advanced as possible, because their growth is slow owing to the want of manure.

The purchase of cane then takes place at the earliest date of cutting, in almost every part of the island, and, consequently, the manufacturers are usually at a loss on account of the low density of the juice of canes cut at this time.

To put an end to this state of affairs, and more especially to induce planters to cultivate canes rich in saccharine matter in preference to poor canes, it has been proposed to purchase cane at a price varying as the density of the juice. This proposal, doubtless an excellent one, when carried out

with certain precautions suggested by science, practically presents grave difficulties. For instance, everyone knows that it is impossible for a manufacturer who takes cane from his own fields, and who, at the same time, receives cart-loads of various varieties of cane from neighbouring growers, to make a standard sample of sugar without delaying to some extent the work of the mill. It is equally impossible for him to have recourse to a small laboratory mill to overcome his difficulty, for the small amount of juice obtained by this kind of apparatus gives no good average of the density of the different canes crushed by it. In the second place, once the density is taken (often a long and delicate operation), it is not possible to form a correct notion of the richness of the cane thus manipulated. If the tables, so carefully calculated by Icery and Biard, were taken as a guide, a figure would be obtained, approximate certainly, and sufficient for practical purposes, although we have proved a difference to exist between the tables and the saccharometer of over 0.50 per cent. in the saccharine richness of the juice, as calculated by Biard, according to density. But the difficulty comes in, in the relation of $\frac{\text{Density}}{\text{Richness}}$ which ceases to follow, in proportion, from the moment that the canes have been cut for several days. On very hot, dry days, we have seen canes from the same field increase in density by the next morning by $\frac{1}{2}$ degree Beaumé. Consider the increase of density and the benefit to the small planter, which must result from this, when the purchase of his cane was concluded two or three days after the cutting.

This increase in density arises without any doubt from the evaporation of the water in the cane, and one might hence arrive at the conclusion that there would, in the long run, be more advantage in manipulating dry cane. But we must not forget that our means of extraction of the juice do not allow us to take advantage of a dry cane which resists crushing, and that our losses at the mill vary in direct proportion to the richness of the cane.

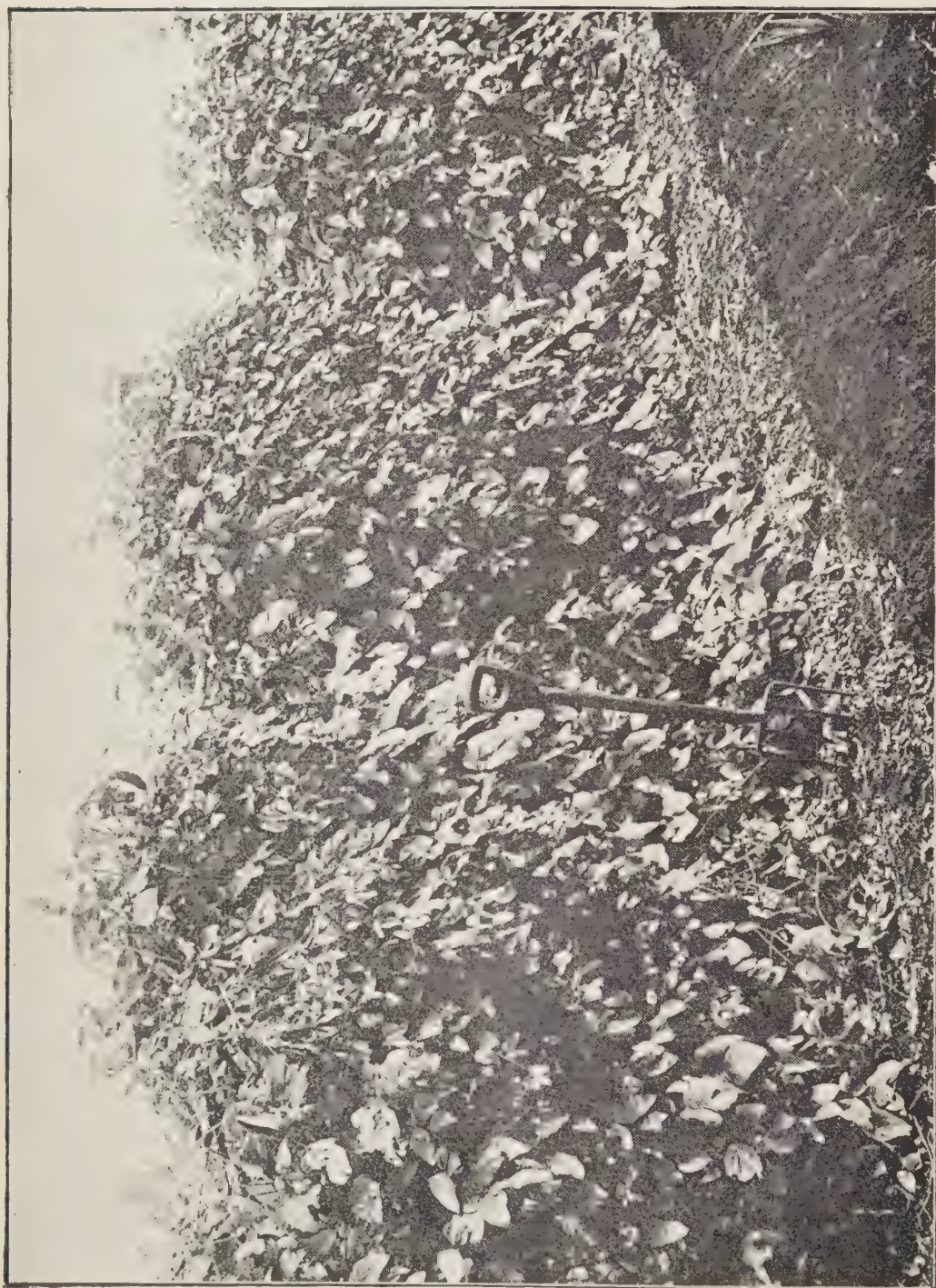
Quite otherwise would be the position of the manufacturer if the juice were extracted by the diffusion process, which leaves a constant quantity of sugar in the results of extraction, whatever may be the richness of the raw material. The purchase of cane according to saccharine density established by means of the saccharometer is the only means of resting on a solid basis every transaction between grower and manufacturer. As a matter of fact, the difficulties arising from the purchase of cane by density, and which arise especially from the narrow relation which exists between the richness of a juice and its Beaumé degree of density, disappear entirely by the use of this instrument.

As to other secondary difficulties arising from grading, we believe that they are less important than the former, and that it would not be impossible to establish a *modus operandi* only valuable in itself to form a medium sample with the help of a relatively restricted number of canes.

But the saccharometer is an instrument still unknown to the greater number of our mills, and much time would be required to persuade all our manufacturers of its usefulness, which is as incontestable as that of the scales for the control of manufacturers.

We have thought of a plan which would enable the planters to make more advantageous bargains, and to induce those who supply them with cane, by degrees to cultivate rich varieties. This plan is the natural result of the saccharometer, for, we repeat, this instrument alone enables us to determine with exactitude the richness of the cane. The plan is: To prepare for each district, or rather for each division, a table representing the saccharine richness of canes of all varieties during different months in which the cutting occurs. This table would be divided into two series of figures, indicating the variations in saccharine richness during rainy and during dry years. We have remarked that the content of sugar varies little from one year to the other for a given locality, excepting when great differences in the climatic conditions occur which may advance or retard the maturing of the cane. You will probably think,

Plate XLII.



BLACK MAURITIUS BEANS, as Grown at Redland Bay.

gentlemen, that it is presumptuous on my part to wish to substitute, for scientific methods which have already been proved, a method which presents no particular precise features, but which, nevertheless, is the result of scientific research, which has established its value. You may think it equally strange that I should have ventured to criticise methods which have already been crowned with success, without bringing forward another which might have at least the merit of proving of greater advantage. But it is not a substitution that I propose: my aim is simply to add to the present methods of investigation the result of a long carefully elaborated study, in order to enable manufacturers to obtain a greater amount of security in their dealings with those who sell their cane to them.

THE BLACK MAURITIUS BEAN.

By ALBERT H. BENSON.

In my previous paper on the Velvet Bean, I mentioned that we were experimenting, at the Redland Bay Experiment Orchard, with several varieties of beans, amongst the number being two so-called Mauritius Beans obtained by me from the Colonial Sugar Company's plantation of Macnade, on the Herbert River, where they are used for the purpose of green-crop manuring. The present sketch refers to the larger of the two varieties, and the name "black" is chosen on account of the colour of the seed.

Botanically speaking, this bean is identical with the Velvet Bean described in the May number of this *Journal*, being a variety of the Cowhage or Cow-itch, *Mucuna pruriens*, var. *utilis*, but differing from the Velvet Bean in its time of ripening and appearance of seed, but closely resembling it in its habit of growth and the general appearance of the flowers and fruit; though the flower clusters of the Black Mauritius Bean are larger and showier than those of the Velvet Bean, an individual cluster setting no less than 28 pods.

The preparation of the land, method of planting, and after treatment were as follow:—

The land was forked by hand to a depth of 12 inches, and the soil reduced to a fine tilth. The beans were planted on 13th December, 1897, in rows 8 feet apart, and single beans were planted 8 feet apart in the row, each plant thus occupying a space of 8 feet square, or 680 plants to the acre. Every other plant was manured with stable manure, but as far as can be seen there is no difference between the manured and unmanured plants. A strong trellis, 7 feet 6 inches high, was erected along the rows, and the plants trained on to it. With the exception of chipping to keep down surface weeds till the plants were able to take care of themselves, no further cultivation other than the preparation of the land was given. At first the growth of the beans was somewhat slow, and compared unfavourably with that of the Velvet Beans, no heavy growth being made till early autumn, and no flowers appeared till the end of May. The growth is best seen by reference to the illustrations herewith. At date of writing (4th July) no seed has ripened, but a number of well-filled pods have formed, and the vines are strong and vigorous, and, though not making rapid growth, are not showing any signs of injury from the comparative cold of winter.

From what I can judge of this bean as grown at Redland, I should say that it is better adapted for tropical Northern than for semi-tropical Southern Queensland, as its growth in this latter part of the colony has been somewhat slow at first, and this is a disadvantage, as for the purpose of green-crop manuring a quick-growing and rapidly-maturing bean that will smother out or check all weed growth is to be preferred, provided it is of equal manurial value—that is to say, equally rich in nitrogen. When grown for green-crop manuring it should be planted in rows of from 4 to 6 feet apart, and single seeds should be dropped at similar distances in the rows; but where seed is required it should be grown on a trellis or other suitable support, as the

Mucunas produce more seed when grown off than when allowed to trail along the ground. As a green crop for ploughing in, it has a high manurial value, as it is rich in nitrogen, and this, combined with the large amount of organic matter it adds to the soil, renders it specially valuable for sugar land, particularly those containing a large percentage of oxide of iron, or of which the soil is of a heavy, plastic, or somewhat unworkable nature.

So far as the Redland experience goes, the beans have been very free from the ravages of any insect pests, the most damage having been caused by the larvæ of the Yellow Peach Moth (*Conogithes punctiferalis*), which bores into and destroys the immature beans in the pods, as it does in the case of the Cow Pea, Velvet Bean, and several other pulses.

The bean is not edible, and I do not know of anyone in the colony who has tried the vines for fodder, but am of the opinion that they should make a good feed if well dried and then chaffed, especially if mixed with bran, chaffed corn or sorghum stover, or molasses. Further experiments will be conducted with this and other beans at Redland Bay, and careful records of same will be kept and, if deemed of sufficient interest, published.

Dairying.

MILK YIELDS.

WE have been favoured by Mr. W. Stephens, M.L.A., with the following results of the milking tests at the Sydney show, in New South Wales, as shown by three fine cows, which are amongst eight lately imported by that gentleman:—

1896—"DAISY"

Took first prize at the Sydney show for the greatest yield of butter. A full account of her performances is contained in the Sydney journals about Easter, 1896.

1897—"BLOSSOM"

Came second in the Sydney competition for this year, yielding 115 lb. of milk in forty-eight hours, resulting in 5.291 lb. butter.

1898—"NUGGET"

Was awarded first honours at the last show of the Logan and Albert Pastoral and Agricultural Society on 6th May, 1898, she having given 59 lb. of milk in twenty-four hours. At the Sydney show her record was 119 lb. of milk in forty-eight hours, with a butter yield of 4.63 lb.

Viticulture.

VINEYARD NOTES.

By E. H. RAINFORD.

In the July number of this *Journal* instructions were given how to make and apply to vines solutions for preventing attacks of Anthracnose or Black Spot. Vignerons in the colder districts, where the movement of the sap takes place at a later period than on the coast, are referred to that article, and strongly advised to follow out those instructions wherever Black Spot has made its appearance. Although this disease may, apparently, be doing little damage,

Plate XLIII.



BLACK MAURITIUS BEANS.

1. Cluster of Flowers and Leaf.

2. Cluster of Pods.

it should not be allowed to continue unchecked, as later on, either through weakening of the vines or adverse climatic conditions, the grapes may be very seriously attacked, and it would then be much more difficult to eradicate it. Vignerons should, on the contrary, hasten, whilst the disease is still limited in its extent, to exterminate it if possible.

Many of the finer qualities of table grapes are badly attacked by Oidium, especially on the coast, and the loss has been in many instances very severe. Although more difficult to subjugate than Anthracnose, still this disease can be very considerably lessened if our vignerons will take the trouble to apply the remedies at the proper moment; but unfortunately some, from indifference and some from multifarious occupations, either neglect to apply any remedy at all or apply it when *too late*. In either case, much and even total loss of the crop follows, and so many complaints have been made about it that it is now a generally accepted idea that only American varieties will do on the coast. Certainly they require little or no preventive treatment for disease, but, on the other hand, these grapes cannot be compared to European varieties for quality, and there is no reason why, if proper precautions are taken, some of the less delicate European table grapes should not do well.

The most effective treatment for Oidium is finely powdered sulphur, and instructions as to its application will be given at the proper time, but washing the vine now with the sulphuric acid solution will certainly lessen the severity of subsequent attacks by destroying the germs which are in the crevices of the bark, &c. The iron sulphate solution has no influence on Oidium.

All the prunings of vines affected by Anthracnose or Oidium should be carefully removed and burnt, and, if possible, the fallen leaves and stalks, &c., collected and burnt. Where there are a few vines of choice varieties, this work would be quickly and easily done, thus greatly lessening the risk of subsequent attacks of disease. Recollect that germs adhering to leaves ploughed into the soil do not lose their vitality, but will reproduce when a subsequent ploughing exposes them to the atmosphere. Do everything possible to prevent sources of infection.

The Orchard.

TREATMENT OF FRUIT TREES WITH HYDROCYANIC ACID GAS.

WE have received from Mr. A. H. Benson, Government Fruit Expert, an extract from the Report of the Government Entomologist to the Cape of Good Hope for the year 1897, which is to the following effect:—

Some 6,600 trees have been treated by the Government (by the above process) in various parts of the colony, in order to demonstrate the method of application and the efficacy of the remedy, and this has been followed by the establishment of a number of co-operative and private outfits, such outfits consisting of from 10 to 30 tents each.

The Government of Cape Colony has assisted the formation of these co-operative outfits, as it has been deemed advisable, and as the method of treatment has been demonstrated to be a success in different parts of the colony by the Government, to let the growers do the work themselves, the Government supplying the raw materials required for generating the gas at cost price to the growers.

Mr. Benson has strongly recommended that the same course be followed in Queensland, and the Minister for Agriculture quite appreciates the excellent results which have followed the Cape experiment. He has therefore instructed Mr. Benson to take steps to initiate experiments.

We feel sure that all fruitgrowers will be pleased to note that a watchful eye is kept over their interests, and will gladly assist in every way in their power to forward what cannot indeed be called an experiment, since it has been clearly proved to be a method of treatment affording the best results at the Cape. Still, climatic differences may exist which will not justify us in saying authoritatively that, because the experiment has been successful in South Africa, it must necessarily be so here. At all events, the probabilities are very much in favour of success, and we have every hope that Mr. Benson's experiments may bear good fruit.

Botany.

CONTRIBUTIONS TO THE FLORA OF NEW GUINEA.

By F. MANSON BAILEY, F.L.S.,
Colonial Botanist.

IN the present paper, and in others to follow, are noticed all new and interesting plants observed or collected by Lord Lamington's party during a recent visit to New Guinea. I shall, where such course may seem to me advisable, give fresh descriptions of some of the old-named species, having had the opportunity of observing them in their native habitat. By this visit I have been enabled to notice the existence of parts or form of parts which could not be observed in dried specimens. I made written descriptions of the plants as soon as they were collected on account of the entire want of proper convenience for drying botanical specimens on board the "Merrie England," and this applies more particularly to the succulent plants. I am extremely sorry for this inability to prepare good herbarium specimens, because copious notes, or descriptions enabling one to fully determine plants and to prepare descriptions for publication, leave one without what is most desirable to have—viz., duplicate specimens to forward to various oversea botanic departments.

Order AMPELIDEÆ.

VITIS, Linn.

V. cordata, Wall. (*Cissus cordata*, Roxb.) A tall glabrous climber. Leaves alternate, elongate-cordate, the basal lobes rounded, 2 to 4½ in. long, the margins with minute white glandular teeth, midrib and lateral nerves often purplish. Cymes leaf opposed, spreading to about 2 in. deep-crimson; peduncles about 1 in. long. Flowers thick, juicy; buds 1½ lines long. Calyx minute, truncate. Petals 4, thick, cymbiform, with inflexed points. Stamens 4, filaments very short. Anthers large golden-yellow, hypogynous disk annular, prominent; style long as the flowers, 4-angled, tapering from the base to a terminal stigma.

Hab.: Mambare River, New Guinea, May, 1898. This plant enjoys a wide range in India and other parts, including tropical Australia, and has been collected as far south as Bundaberg. I have, however, never met it so richly coloured with us as in New Guinea.

Order LEGUMINOSÆ.

PTEROCARPUS, Linn.

P. indicus, Willd., var. A small tree, branchlets angular, bearing numerous lenticels. Leaves deciduous, alternate, pinnate, about 6 or 9 in. long, including petiole, which like the rhachis is slender; leaflets irregular, some being opposite, others alternate, all petiolulate, oblong-acuminate, 2 to 3 in. long, the points often long. Racemes or racemose-panicle about 5 in. long. The flowers of

the New Guinea tree not having been seen by me, I extract from Hooker's Flora of British India, Mr. J. G. Baker's description of them from Indian trees:—"Flowers in copious terminal and axillary panicles with subsecund racemose branches, clothed with fine brown pubescence; pedicels 3 or 4 lines, furnished with a pair of linear spreading caducous bracteoles at the apex. Calyx about 3 lines, finely brown-silky; teeth rounded, the two upper much the largest. Corolla exceeding the calyx; standard about $\frac{1}{2}$ -in. broad. Stamens in two or three bundles." Pods more or less silky, shortly stipitate, 2 or 3 in. in diameter, including the broad wing by which it is surrounded, more or less strongly veined.

Hab.: Around the small bays, foot of Mount Trafalgar. I have also fruiting specimens from Mr. W. E. Armitth of the same tree, so perhaps it is common in New Guinea. Judging from what I saw of the tree, it differs from the Indian form in size only. Gamble ("Indian Timbers") says: "A lofty tree, sometimes evergreen"; and, furthermore, that "The plank sent to the Paris Exhibition of 1878 measured nearly 4 feet across, and that a portion of the same log from which the plank was cut fetched a price of £17 10s. per ton." All botanists who have examined specimens of the New Guinea tree seem to have come to the same conclusion—viz., that they belonged to *P. indicus*, Willd. It probably, however, is a small growing variety, for in a country so deficient of useful timbers as New Guinea if this tree attained anything like its Indian growth we should long since have heard of it.

Order RUBIACEÆ.

MUSSÆNDA, Linn.

M. procera (n. sp.) A tall, rambling, velvety, pubescent shrub; its height in the scrubs being traceable by the white calycine leaves to 20 or 30 ft.; branchlets marked with white lenticels. Leaves lanceolate, 3 or 4 in. long, on petioles of about $1\frac{1}{2}$ in.; lateral nerves about 12 on each side of midrib, mostly opposite and very prominent; stipules 4 lines long, hairy. Flowers in trichotomous terminal cymes, pedicels short the flower on the forks usually sessile. Bracts very small, narrow, and hairy. Calyx-lobes very narrow, persistent; the largely developed one white, with a stalk 1 in. long; the lamina ovate-lanceolate, $1\frac{1}{2}$ in. long. Corolla a deep-orange yellow, tube slender, about $1\frac{1}{4}$ in. long, swelled near the top around the anthers; lobes 5, about 4 lines long, tapering to narrow points, densely bearded at the orifice and inside of the tube. Anthers linear. Style with a rather thick 2-lobed stigma.

Hab.: Porlock Bay and Mambare River, New Guinea, May, 1898.

I am under the impression that specimens which have from their imperfect character been received from New Guinea of this species by botanists have in some, if not in all, cases been recorded under the old species, *M. frondosa*, Linn., to none of the forms of which in my opinion does the present plant well agree. Therefore, at least for the present, it had better be known under the above distinctive appellation.

GARDENIA, Linn.

G. Lamingtonii (n. sp.) (After His Excellency the Right Honourable Lord Lamington, K.C.M.G.) Tall spreading glabrous shrub or small tree. Leaves oblong-lanceolate, 3 to 6 in. long; abruptly-acuminate, tapering to a petiole of about 5 or 6 lines, glossy above, pale on the underside; lateral nerves 8 or 9 pairs, with rather prominent glands in the axils where they join the midrib on the back of the leaf. Stipules soon deciduous, 1 in. long, flat. Flowers solitary in the upper axils, white in the early morning, but soon turning a dark-yellow and keeping expanded all the day, nearly sessile. Calyx-limb loose-tubular about 1 in. or $1\frac{1}{2}$ in. long, membranous, often split down one side for a quarter of its length, irregularly lobed at the top. Corolla-tube slender exceeding the calyx by about 2 in., lobes 6, oblong, somewhat suddenly narrowed at the base, 1 in. long. Anthers attached by their backs just below the tube, the base produced into a filiform appendage about $\frac{1}{2}$ -in. long, narrow, only about half appearing above the orifice of corolla-tube. Style in the upper part clothed with erect hairs; stigma with short lobes, ovary 6-ribbed, 6-celled, ovules numerous. Fruit (not ripe) oblong-globose, about 1 in. long, still crowned by the long tubular calyx. Seeds glossy, reticulate.

Hab.: Margins of small bay, foot of Mount Trafalgar.

Order APOCYNACEÆ.

LYONSIA, R. Br.

L. viridiflora (n. sp.) A tall glabrous climber. Leaves broadly-ovate, apiculate, 4 to 5 in. long, dark glossy green. Petioles 6 to 9 lines long, slender. Cymes on axillary peduncles of about $1\frac{1}{2}$ in., bearing 3 forked branches. Flowers green, pedicellate. Calyx-lobes orbicular, about a line in diameter, ring at base a mere line. Corolla-tube gibbous, about as long as the calyx, glabrous inside; lobes 3 lines long, $\frac{3}{4}$ -line broad. Staminal cone narrow, filaments twisted, hairy. Hypogynous scales yellow, glabrous, slightly lobed at the top. Ovary glabrous. Follicles about 5 in. long. (None obtained, only seen out of reach up the trees.)

Hab.: Climbing over shrubs and up trees. Chads Bay, New Guinea, May, 1898.

Order ASCLEPIADEÆ.

HOYA, R. Br.

H. Lamingtoniæ (n. sp.) (After Lady Lamington.) A tall, dense, delicate succulent twiner. Leaves lanceolate-acuminate, 2 to 3 in. long, scarcely exceeding 1 in. wide, of a rather pale-green, the gland on the face indicating the position of the attachment of the petiole somewhat raised; lateral nerves few, very oblique, triplinerved at the base, glabrous on both sides, the underside more or less speckled with purple. Petiole 3 or 4 lines long. Peduncles $1\frac{1}{2}$ in. long, bearing an umbel of about 12 deep maroon-coloured flowers. Pedicels slender, about 1 in. long. Calyx-segments $\frac{3}{4}$ -line, narrow. Corolla expanding to a diameter of 8 lines; the lobes blunt, margins slightly recurved, bearing short almost white hairs, otherwise lobes glabrous on both sides. Corona-segments under 2 lines long, glossy, cymbiform, coriaceous, viewed from the underside resembling a small grain of wheat.

Hab.: Twining over the shrubs and trees near the water's edge of small bay, foot of Mount Trafalgar, New Guinea. One of the most beautiful of the genus, and should be introduced into garden culture.

H. dimorpha (n. sp.) A stout strong twiner, the extremities often slender with much smaller leaves. Leaves thick-coriaceous, oblong-acuminate, slightly cordate at the base; those on the thick portion of the stem exceeding 5 in. in length and 2 in. in breadth; those on the slender ends often cordate and under 2 in. long, glabrous, underside pale, the gland on the face indicating the attachment of the petiole, beneath often a broad ciliate disk at times more or less umbonate. Petiole stout, usually less than $\frac{1}{2}$ -in. long. Peduncles slender, 2 to 3 in. long, bearing an umbel of many—27 or more—small flowers. Pedicels about 1 in. long, purplish; flower-buds 5-angled, about 3 lines in diameter. Calyx-segments triangular, $\frac{1}{2}$ -line long. Corolla nearly white, 5-lobed, expanding to about 5 lines diameter, silky-hairy on the back, more prominently so on the margins, and also forming a ring around the orifice of the corolla-tube, nearly glabrous on the face. Corona white glossy, segments about 1 line long, concave above, the sides produced into thick wing-like ribs beneath.

Hab.: Twining over shrubs and trees growing on the margin of the small bays at the foot of Mount Trafalgar, New Guinea.

H. coronaria, var. *papuana* (n. var.) A robust tall twiner. Leaves oblong-ovate, thick-coriaceous, 4 or 5 in. long, slightly peltate, the apex with a rather long point, 2 to $2\frac{1}{2}$ in. broad at the centre, upperside glossy, the underside clothed with a close, short, stellate tomentum of a dirty-white colour; lateral nerves distant, nearly horizontal, only visible on the upperside, the gland indicating the attachment of the petiole, beneath scarcely visible. Petiole about 1 in. long. Flowers in almost sessile short racemes; the peduncle thick, stellate-tomentose, about 5 or 6 flowers open at a time. Pedicels tomentose, about $\frac{1}{2}$ -in. long. Flower-bud a thick 5-rayed star, the rays recurved,

expanded flower about $1\frac{1}{2}$ in. in diameter, at first somewhat greenish, ultimately almost ivory, white or very pale-yellow. Calyx-segments very obtuse, 2 lines long, tomentose. Corolla-tube swelled, very short, the inside lined with simple silky hairs; lobes broad with strongly reflexed margins, glabrous and glossy above, stellate-tomentose beneath. Corona-segments colour of the corolla, about 1 line in diameter, 2-ribbed on the underside. The flowers seem very near *H. coronaria*, Blume, but without the scattered purple dots on the flowers of that species.

Hab. : Twining up trees on the margins of a small bay, foot of Mount Trafalgar, New Guinea.

Order LOGANIACEÆ.

FAGRÆA, Thunb.

F. obovata, var. *papuana* (n. var.) A tall shrub or dwarf spreading tree; branchlets stout, covered with the scars from fallen leaves. Leaves crowded at the ends of the branchlets, thick-coriaceous, dark-green above, pale beneath, 5 or 6 in. long, 2 or 3 in. broad, oblong, obtuse or very shortly and bluntly acuminate, slightly cuneate or rounded at the base. Primary nerves rather distant, parallel, distinct above, indistinct on the underside. Petioles often exceeding 1 in., with 2 short, shield-like, blunt, thick stipules attached to their base. Flowers very fragrant, white, in stout terminal cymes, each branch usually bearing 3 puberulous subcoriaceous flowers on short pedicels, the pair of bracts under the branches oblong and about 6 lines long, recurvately spreading, those subtending the flowers triangular, very short and thick. Calyx-tube very short; lobes obtuse, about 3 or 4 lines long, very thick. Corolla soon white turning to a cream colour; tube about 2 in. long, constricted at the top of the calyx, from thence slightly enlarging upwards, the inside to the attachment of the stamens or three-quarters the length of the tube with transverse corrugations; lobes 5, oblong-cuneate, about 8 lines long. Filaments 5, $2\frac{1}{2}$ lines long, suddenly bent back at the top. Anthers erect, longer than the filaments. Style glabrous. Stigma with 2 short spreading broad lobes. Ovary glabrous. Fruit obovate, about $1\frac{1}{2}$ in. long. Seeds curved, glossy, tuberculate, very numerous, about 1 line long, immersed in a white pulp.

Hab. : On the edge overhanging the water of the small bays at the base of Mount Trafalgar, New Guinea. May, 1898. This plant approaches *F. obovata*, Wall., but differs in bracts, shortness of filaments, and length of anthers. The orifice of the tube also is much narrower than in that species, neither is it (*F. obovata*) described as corrugated on the inside of the tube.

Order ACANTHACEÆ.

TRIBE JUSTICIEÆ.

JUSTICIA, Linn.

J. Gilligani (n. sp.) (After Mr. John Gilligan, one of the party.) A tall glabrous shrub; stipules soon deciduous, forming a sheath 3 or 4 lines long above the attachment of the leaves. Leaves on short petioles nearly sessile, lanceolate, 6 to 9 in. long, the points much elongated, margins repand with here and there minute glandular teeth. Racemes secund; lateral 2 to 4 in. long, scarcely pedunculate; rhachis puberulous; bracts small, lanceolate. Pedicels very short, bracteoles small. Calyx-lobes about 3 lines long, narrow. Corolla clothed with short hairs, of a wine-stained purple; tube narrow, $\frac{1}{2}$ to $\frac{3}{4}$ in. long, enlarging upwards to a very oblique orifice; limb 2-lipped, upper lip 2-lobed, lower lip 3-lobed, lobes reflexed narrow-linear, about 10 or 11 lines long, $\frac{3}{4}$ -line broad. Filaments glabrous. Anthers sagittate, 2-celled and often divided at the summit, thus 2-lobed. Style slightly exceeding the stamens, glabrous filiform; ovary glabrous. Capsule exceeding 1 in. in length, hard, contracted into a solid seedless base, beaked at the apex. Seeds 4, flattish, cordate, strongly tuberculate, of a deep purple when first gathered.

ab. : Bay, foot of Mount Trafalgar.

In flower this plant resembles a *Graptophyllum*, while the seeds are like those of *Ecalium*. Not feeling quite certain as to genus, I have provisionally placed it in the old large genus *Justicia*. What I take for the variety of *Graptophyllum hortense*, var. *lurido-sanguinea*, is one of the plants commonly grown near the huts of the natives, but at the time of our visit the plants were out of bloom.

Order ORCHIDEÆ.

DENDROBIUM, Sw.

D. Giulianettii (n. sp.). (After A. Giulianetti, Naturalist to the New Guinea Government.) Plant often large, but seen at times flowering when only about 6 in. to 1 ft. high and with few stems. Stems attaining 2 or 3 ft., somewhat slender at the base, above which swelling to a diameter of over 1 in., then tapering towards the apex, often more or less purple; the upper portion, which is the principal part of the stem, more or less compressed. Leaves about 4 on the flowering stems, coriaceous, 4 or 5 in. long, slightly tapering from a broad base to an emarginate apex. Peduncles from the axils of the lower leaves, with rhachis 6 to 9 in. long; sheathing bracts 3 or 4 lines long, obtuse-apiculate, with numerous prominent ribs; bracts subtending the pedicels lanceolate; racemes containing about six flowers. Pedicels, including the ovary, 1 to 1½ in. long. Sepals and petals 1 in. long, 3 lines broad, linear-lanceolate, slightly recurved, not curled, light-brown, striated; the lateral sepals somewhat constricted at the base, then forming a rather small spur. Labellum long as the other segments, the face closely marked with dark-brown forked lines; lateral-lobes erect, incurved, enclosing the column, middle-lobe ovate-apiculate, with undulate margins; disk plates 3 or 5, between the lateral lobes, three extending half-way up the middle lobe. Column very short and broad. Anther-lid very small, tomentose. Pollen-masses very large, lifting the lid even before the flower expands. Fruit probably large, not seen quite ripe, oval-oblong, with 3 very prominent and 3 intermediate ribs.

Hab. : On trees, Holdicott Bay, New Guinea.

This species seems to approach *D. Mirbelianum*, Gaudich.

The present species, while not remarkable for great beauty of flower, is of interest from what seems to me an unusual mode of fertilisation. As noted in the above description, the pollen-masses are very large in comparison to the anther-lid. It would seem, therefore, from examinations of the flowers from the bud to the fully developed bloom, that the pollen-masses are pushed out from under the lid by their increasing size just previous to the flower expanding, and are thus attached by their thick ends only, for I found in all the fully opened flowers which I examined the four masses of pollen in pairs one below the other, their smaller ends curving upwards, thus giving to the stigma the appearance of being furnished with 4 horns, the most remarkable feature being that the pollen-masses thus attached do not become absorbed and wither away, but become a firm cellular substance. Thus it is seen that each flower in this species is fertilised by its own pollen just previous to the flower expanding. The above I found to be the habit of this plant at its native habitat; it now remains to be seen if the same occurs under cultivation.

D. breviraemosum (n. sp.) The erect stems 6 to 12 in. high, somewhat fusiform, closely and sharply fluted, glossy where not covered with leaf-sheath; usually crowned with 3 ovate-oblong coriaceous leaves 5 or 6 in. long and obliquely apiculate. Peduncles 12 to 15 in. long, erect, terete except near the top, where it becomes slightly angular, terminating in a raceme of from 1 to 1½ in. Empty bracts 4, obtuse, 4 lines long on the lower part of the peduncle, the upper ones and those subtending the pedicels obtusely 3-angular and only about 2 lines long. Pedicels 1½ in. long. Flowers in each raceme about 6, yellowish, with a tinge of green, of somewhat coriaceous texture,

expanding to a diameter of about 1 in., all the segments except the labellum incurved. Dorsal sepal $3\frac{1}{2}$ lines broad, the lateral ones much broader from being adnate at the base to the whole length of the elongated base of the column, speckled with purple spots in irregular lines, spur or pouch scarcely perceptible. Petals like the sepals, but only about half as broad. Labellum on a short broad claw attached to the end of the column; lateral lobes erect, $3\frac{1}{2}$ lines high, tapering to blunt points, with 5 longitudinal dotted lines; middle lobe rather longer than broad; the end rounded, emarginate, 6 lines broad, tapering downwards. Disk plates between the lateral lobes and extending somewhat higher up, 2 outer ones very prominent, those between them not half so high, all with irregular margins. Column very short and broad, mostly green. Stigma deeply sunk. Rostellum with white border. Anther-lid flat, green. Pollen-masses nearly globular, amber colour.

Hab. : Douglas Harbour, New Guinea, May, 1898.

D. D'Albertisii, Reichb. f. Erect stems numerous, forming dense masses upon the trunks and branches of trees, 6 to 12 in. or in some localities higher, the lower part obtusely 4-angular, and 4 to 9 lines in diameter, the upper portion tapering upwards, somewhat flattened and leafy. Leaves lanceolate, the lower ones 3 to 4 in. long, gradually decreasing in size to the apex of the stem, where they are often under 1 in. long, thick and distichous. Peduncles numerous from the axils of the underleaves. Bracts small, 2 or 3, empty. Pedicels with short ovary 12 to 15 lines long, white. Dorsal sepal curled, lateral ones recurved and sometimes slightly curled, white, about 9 lines long. Petals erect, about $1\frac{1}{2}$ in. long, 1 to $1\frac{1}{2}$ lines broad, green in the upper half, white in the lower, usually strongly curled, spur narrow. Labellum long as the sepals, attached to the base of the column by a short narrow claw; lateral lobes erect, tapering downwards and forming a cuneate base to the labellum above the truncate yellow-stained end, obliquely streaked with purple; middle lobe ovate-apiculate, purple lined. Disk plates 2, with sometimes jagged margins. Column white, with rather thick wings ending in a tooth on either side of the anther. Anther-lid flat, densely tomentose in front. Rostellum white in front. Pollen-masses oblong, amber colour.

Hab. : Holdicott Bay, New Guinea. The above description was written from plants freshly gathered at their native habitat, and may therefore differ in some slight degree from some of the descriptions given, which have been obtained from dried specimens or plants in cultivation.

SPATHOGLOTTIS, Blume.

S. papuana (n. sp.) Pseudobulbs $1\frac{1}{2}$ to 3 in. high, obtuse conical, crowned by grass-like plicate leaves, their sheaths forming a thin stem of 2 to 5 in.; the lamina 12 to 15 in. long and 1 in. broad in the centre usually, but in some localities much larger, tapering to long fine points. Scapes 15 in. or more high, empty lower bracts closely sheathing the stem, those subtending the pedicels loosely spreading, broadly ovate. Pedicels with ovary about $1\frac{1}{2}$ in. long, very pale-purple. Flowers about 6 in terminal racemes, varying on different plants from a magenta or dark-purple to nearly white. Sepals and petals about 8 or 9 lines long, oblong-ovate. Labellum nearly as long; lateral lobes 3 or 4 lines long, salmon-coloured, falcate-cuneate very near the base with a minute lobe at the end of each in front; middle lobe on a long slender claw, broadly-cordate, nearly white; disk plates 2, erect, spreading, rather large and a smaller one at the top of the claw. Column enlarging upwards, incurved, pink; anther-lid and rostellum beaked.

Hab. : Along the coast of Porlock Bay. In the crevices and on the face of rocks in the leaf-mould which is often found to collect in such situations.

There are three forms of this species, only differing in colour of flower: one nearly white with only the least tinge of purple; another, pale-purple; and another whose flowers are deep purple or magenta. These are frequently met with growing together on the same rock; therefore the difference of colour cannot be due to situation or soil, neither is it due to age, for the colouring is the same from the opening of the buds in each form.

ACRIOPSIS, Reinwdt.

A. Nelsoniana (n. sp.) (After the Right Honourable Sir Hugh M. Nelson, K.C.M.G.) Pseudobulbs about 2 in. high, arising from a mass of erect whitish roots, fluted, and bearing at the summit usually 4 linear leaves varying from 4 to 8 in. in length, with a breadth of less than 1 in., plicate and sharply keeled, apex bluntly pointed. Scapes from base of pseudobulb erect, 2 feet high, branched in the upper part, the branches ending in racemes of small pretty flowers; bracts lanceolate, small, and numerous. The whole inflorescence slender and wiry. Pedicels with ovary 4 lines long; sepals and petals linear, about 3 lines long and $\frac{1}{2}$ -line broad, yellowish with a green tinge. Labellum white, the lower part adnate to the sides of the base of the column, the upper portion deeply 3-lobed; lobes obtuse, the middle one bearing upon its disk 2 erect prominent plates. Column with a projecting stipitate gland-like process on either side of the stigma. Rostellum gland-like. Anther-lid membranous, completely covered by a hood formed by an elongation of the apex of the column. Pollen-masses 2, clavate on rather long filiform caudicles, the gland to which they are attached being rather prominent.

Hab.: Gira River, New Guinea.

Order SCITAMINEÆ.

COSTUS, Linn.

C. Lamingtonii (n. sp.) (After His Excellency the Right Honourable Lord Lamington, K.C.M.G.) Plant of somewhat straggling habit, the erect stems attaining 6 or 7 ft, often slightly spirally twisted; the whole plant, with the exception of the seed and parts of the flower, velvety-pubescent. Leaves oblong-lanceolate, 6 to 12 in. long; lateral nerves erecto-patent from the midrib, parallel and rather close; sheath closely clasping the stem, petiole above the sheath and ligula, about 2 or 3 lines long. Inflorescence a terminal oblong spike usually about 4 in. long, of a deep rusty-red colour; flowers white. Bracts: Outer—broad-lanceolate, 1 in. long, velvety outside, the inside striate; inner—linear, obtuse, $\frac{1}{2}$ in. Calyx-tube $\frac{1}{2}$ -in. long, 3-toothed at the top, 3-angular, inside striate. Corolla-tube $\frac{1}{2}$ -in. long, bearing inside near the orifice numerous yellow clavate glands; upper erect lobes 3, glabrous, oblong, membranous, $1\frac{1}{2}$ in. long. Labellum about 2 in. long, the sides incurved forming a tube with a broad wavy mouth, velvety on both sides, disk stained with yellow. Filament broad, produced beyond the anther, the end sometimes torn or lobed. Style slender semiterete in the upper part, where it lies between the anther-cells, expanding about the stigma. Capsule almost 3-winged, crowned by the persistent calyx, about 6 or 7 lines long, opening loculicidally in 3 slits. Seeds shining black, numerous in each cell.

Hab : Mambare River, New Guinea.

TAPEINOCHEILOS, Miq.

T. pungens, *Miq.* Stems leafy, 5 or 6 ft. high, below the inflorescence, close under which long curved leafy branches are emitted. Leaves 6 to 8 in. long, lanceolate with long narrow points, set on the branches spirally, contracted into a short petiole above the long sheathing base; spike very dense, 6 to 12 in. long and 2 or 3 broad, yellowish. Bracts not so pungent as in the Queensland plant. Calyx forming a horny shortly 3-lobed tube above the ovary. Corolla horny-lobed lower down than the calyx. Filaments broad, petaloid; the 2 anthers attached by their base only, the upper portion of the broad filament forming a hood over them. Style narrow, expanding at the top, and forming a broad hairy indusium about the stigma.

Hab : Mambare, New Guinea, May, 1898.

The above are a few notes made when the specimen was gathered. This New Guinea plant is, in my opinion, the true *T. pungens*, Miq., and the Queensland plant recorded under this name a distinct species. The description in Fl. Austr. VI., 267, was taken (Mr. Bentham says) "from Miquel's elaborate description and figure, and from a fruiting specimen received from the Botanic Gardens, Calcutta. The distinction between these two plants is principally in the inflorescence; in the one it is terminal, while in the other it is borne upon a separate stem or scape. In both, the branches are much curved, and the leaves are placed upon them in a spiral manner. The cone or spike which I examined at Mambare was an old elongated one, from which, probably, much of the brightness of colouring and pungency of the bracts had been lost, and it had no fresh flowers suitable for obtaining a good description.

Order FLAGELLARIEÆ.

FLAGELLARIA, Linn.

F. indica, Linn. The fruiting specimens which we met with in New Guinea of this common tropical climber differed from the Queensland plant in that the fruits were pear-shaped, not round.

Order PANDANACEÆ.

PANDANUS, Linn.

P. dubius, Spreng. (*Hombronius edulis*, Gaudich; *P. triodon*, Bail.) Tree with a stout stem 20 or more feet high, emitting aerial roots, branching, and very leafy. Leaves a deep glossy-green, coriaceous, 7 or more feet long, and often exceeding 6 in. broad, somewhat abruptly tapering to a sharp long tail-like point, serrated along the margins, also bearing on the underside of the midrib rather distant prickles. Male inflorescence not seen. Fruit-heads borne upon the lateral branches chalky-white or glaucous, large, containing about 80 drupes or syncarps about 4 in. long, 2 in. broad, 6-angular, the upper free portion tapering to a flat apex bearing usually 3 hard somewhat spathulate prominent stigmas, which resemble the teeth of some animal. (The drupes in an unripe state are very juicy.) The bony 3-celled endocarp of the ripe fruits examined was flat, about $1\frac{1}{4}$ in. long and as broad at the upper end, situated in the lower half of the drupe; mesocarp a soft spongy fibrous matter. Seeds 9 lines long, 2 lines diameter, integument grey; kernel white, sweet, resembling cocoanut in flavour.

Hab. : Douglas Harbour. We saw this plant at other places along the coast. The natives often plant it near their huts on account of the leaves being used by them for mat-making and the petticoats worn by the women. It is the leaf of this plant which is used by the men for their loin-band, usually their only article of dress.

Order GRAMINEÆ.

PANICUM, Linn.

P. sanguinale, Linn., var. A prostrate creeping low grass, the ascending extremities 6 to 12 in. high and leafy; internodes close, nodes glabrous. Leaves lanceolate, 1 to 2 in. long, margins broken, almost crenulate, undulate; sheaths loose, glabrous, except for a number of rather long weak hairs near the base. Spikes 2 or 3, about 2 in. long; rhachis flexuose, glabrous with green margins. Spikelets 2 at each notch, one sessile, the other pedicellate, the notches rather distant. Outer glumes very minute, second and third silvery and margined by long spreading silvery hair-like scales. Fruiting glume glabrous, pale or hyaline.

Hab. : On the sandy beach, Mambare, New Guinea, May, 1898. This grass is nearly allied to the Brazilian species, *Digitaria marginata*, Link.

COIX, Linn.

C. Lachryma-Jobi, Linn. Job's-tears. Two distinct forms of this tall grass are common in New Guinea; the fruits of each being chalky-white and used by the natives in ornamentation.

One form has fruit very nearly like that of the normal or the one most usually met with in garden culture, the fruit being tear-shaped.

The other is var. *stenocarpa*, Stapf.; fruit agreeing with Sir J. D. Hooker's description in Fl. Brit. Ind., VII., 100. Fruit cylindrical or slightly tapering towards the base, about 4 lines long.

Order FILICES.

DAVALLIA, Sm.

D. parallela, Wall. Rhizome often creeping to a considerable extent over the tree stems, scaly with dark-brown close scales, margins of which are scarious and ciliate. Stipes with scales similar to the rhizome, 2 to 5 in. long. Fronds long as stipes, ovate-lanceolate, acuminate, coriaceous, 2 in. or more broad, deeply pinnatifid nearly to the midrib; lobes horizontal, rather close, linear-oblong, the longer ones slightly falcate, entire or the lowest pair sometimes with a minute lobe at their base; veins simple or forked. Indusium broad lunate, opening towards the apex of the lobe.

Hab.: Douglas Harbour, New Guinea

This rather widely spread fern has before been met with in New Guinea. The description is only given with an idea that it may assist persons to identify it, who may wish to cultivate it in their bush-houses.

SCOLOPENDRIUM, Sm.

[EUSCOLOPENDRIUM.]

S. mambare (n. sp.) Rhizome wiry, angular, dark-brown, scaly on the younger portion, the scales few and scattered on the older parts, often forming a dense mass on swampy land and roots and stumps, but not climbing up the trees, emitting strong wiry roots. Fronds erect, linear-lanceolate, sometimes forked at the end, often exceeding 1 ft. in length, and not exceeding 9 lines in width; the margins irregularly sinuate, sometimes the lobes cut down to the costa, all more or less sharply serrate, tapering to an almost filiform apex, and at the base to a stipes of 2 or 3 in.; stipes and costa slightly scaly, with minute scales. Veins free, simple, or forked, rather close, parallel. Sori from the costa to near or some distance from the margin.

Hab.: Swamps, Mambare River, New Guinea.

The present plant in some respects approaches the one mentioned in Baron Mueller's "Papuan Plants," 49, as *Asplenium scolopendropsis*, collected by D'Albertis on the south-east part of New Guinea, but differs too widely from the description there given to be placed under the Baron's name; besides, I consider that the genus *Scolopendrium* should be retained, and in that case, even if the two prove identical when specimens are compared, his specific name could not well be retained.

Popular Botany.

OUR BOTANIC GARDENS.

No. 6.

By PHILIP MAC MAHON,
Curator.

To resume our walks in our Gardens. You are now standing at the bottom of a flight of steps which leads from a knoll to the lower ground. Around you tower the palms, about which we have spoken in previous chats. Your position is at the spot indicated on the map as L. 10. By walking back towards the lily ponds a few yards, you will notice two trees close together with dark-green glossy foliage. These are the Moreton Bay Chestnut. It is a beautiful shade tree of a very distinctive character, better suited for planting in picturesque groups than for avenue planting. Amongst stockowners it has a somewhat sinister reputation, as it is said by some that stock browsing on the leaves during periods of drought become injured, and by others that the fallen seeds poison cattle when picked up by them. The case against the tree has not, however, been at all proven. It is possible that where cattle have picked up the hard seeds these latter may have acted in a few instances as any other foreign body of a hard nature would act in the stomach. The natives use the seeds for food. In 1866 Mr. C. Moore, as we learn from Mr. Maiden, exhibited flour made from the seeds of this tree, and which when made into bread tasted something like a coarse ship's biscuit. The seeds are soaked by the natives for a week, then roasted and finally pounded into a flour which they can carry with them in all their wanderings. The wood makes beautiful specimens of the turner's and cabinetmaker's art, when the sapwood has been cleaned off. In the museum of the Department of Agriculture may be seen beautiful specimens of the heartwood of this tree; in fact, the scrubs and forests of Queensland teem with woods highly suitable for turnery, veneers, and art furniture of all descriptions. There is not as yet a large demand for these very beautiful woods outside the colony. Buyers of this class of timber, and indeed of all timbers at the great centres of trade, require that the supply should be constant, reliable, and uniform in quality before they will consent to discard old and tried favourites in favour of new and more or less experimental ventures, however tempting.

Close by is the aviary. As this is not a department to which any money can be devoted, the collection of birds is not extensive, but it comprises some well-known Queensland varieties. In a corner, almost concealed from view, a pair of bower-birds have commenced to construct their peculiar bower, a short avenue of twigs which have their thicker ends stuck into the soil, and the thinner ends almost meeting above, forming a kind of tunnel-like arbour. See! there comes the female bird. She has seized upon a yellow feather which has fallen from the crest of the sulphur-crested cockatoo, and she fixes it at the entrance of the arbour. Then with head turned to one side she surveys the effect through one of her deep violet coloured eyes. No! it will not do like that. For some bird-reason, quite unintelligible to the human onlooker, she decides to shift it, and this she does several times, until at last the precise artistic effect she desires is obtained, and she suffers it to remain.

It is only within a quite recent time that native birds have begun to understand that there is safety for them in these Gardens so far as safety can be secured. To-day three lovely regent-birds disported themselves outside the office here, and seemed as much at home as if in the pathless woods. A beautiful little kingfisher has for some time taken a lease of one of the ponds. There he sits on a slender twig, without any apparent interest in anything on earth, but let a tiny fish or tadpole show itself for an instant, and then like a falling star he swoops diagonally down, and seldom, if ever, fails to return with the dainty morsel, and in a moment afterwards is as reposeful and indifferent as ever. It would not strike you that here in the middle of a city of about 100,000 people there would be much to notice in the way of indigenous animals and birds, and yet a good-sized book could be written about those that are to be found here and their peculiarities, and they will be mentioned from time to time in these papers.

Can the dwellers in the bush to whom these papers may come, or residents of other countries, send us some birds for our aviary? They shall be well treated, and have plenty of space almost amounting to freedom; and they will give pleasure to thousands, besides enjoying their lives so much more than if immured within the narrow limits of a cage.

Turn round and walk in the direction of the shade garden (bush-house). To your right hand is a border in which are, besides the palms previously noted, some plants of interest. Conspicuous you will notice the plant which goes in Queensland by the name of the Breadfruit-tree. Many people hearing this name think that this is the famous breadfruit of the South Sea Islands. It is a very different plant indeed. It bears upon the extremity of each somewhat palmlike branch a large fruit, or, to be botanically accurate, a collection of fruits grouped together like a pineapple. These have a kind of resemblance to a cottage loaf. The Queensland aborigines are fond of the kernels of the fruits. They call the tree "Wynnum," and hence no doubt the name of a watering-place near Brisbane. The flowers generally escape observation, but they hang in long clusters, and on a near view are quite beautiful. Bees seem to reap a rich harvest from the flowers of several species of *Pandanus* here, judging by the way in which they crowd upon them. As this plant grows upward, roots grow from the stems, and those growing downward and outward serve as oblique props to support the plant, in exactly the same way as one would prop up a wall showing signs of collapse. If you take one of these roots before it reaches the ground, you will be very much interested in noting how the delicate end is protected by two or three coverings of paper-like material, which look like so many hats placed on top of one another. Sometimes in this family the centre stem dies away close to the ground, and then the roots become the only support, and very quaint they look, these plants, standing as if on stilts. You will see the same arrangement in mangroves by the margins of tidal rivers. They stand very often above the mud on queer, stilt-like roots, sometimes, when the tide is out, seeming like some sea monsters come up to have a look around.

A very beautiful plant of the same family is *Pandanus Veitchii*, which grows quite close by. It is highly prized in Europe, where it is cultivated in stoves at considerable expense. It grows very well in Queensland, and is, besides being very hardy, exceedingly ornamental. It is readily propagated by means of offsets, which it produces in great abundance.

A quaint plant growing quite close by is called *Euphorbia Tirucalli*. It is a dark-green shrub about 15 feet high. You notice when you look closely at it that it has no leaves, and that the stems branch out like those many-branched candlesticks which may be seen in some cathedrals. The leaves are reduced to mere scales, which soon fall off, but, as the business of transpiration

must be carried on, this is performed by the green cuticle of the stem. We would naturally expect a plant equipped in this way to be a dweller, when at home, in a rocky, sandy soil, where rain seldom falls, and then sparsely. And we find that this is the case. It is generally possible to tell from even a cursory examination of the appearance and structure of a plant under what conditions it will thrive best, because every plant is so organised as to make the very most of the conditions under which it is naturally found. Take, for instance, our friend the Euphorbia, which we are just discussing. Not only are the leaves suppressed, so that too much moisture shall not be sent off under the pitiless rays of the scorching sun as it beats down on the sandy plains of Mexico, but there is a reserve store of moisture saved up, not for the proverbial rainy day, but for a long drought, in what are known as the lactiferous vessels in the stems. If you cut one of these stems, the milky fluid gushes forth. Very many plants known as succulent plants, which include a good many Euphorbias, have this store of moisture in readiness to carry them over an adverse time, and for this quality they have been compared to the camel among animals, which carries with it the saving of a time of plenty for the day of need. The resemblance is heightened by the fact that they are found usually in the same situations as the "ship of the desert."

The Wild Pineapple (*Bromelia sylvestris*) close by will catch your eye. It grows rapidly, requires little rain and no attention, looks well, and, being armed with sharp prickles, makes a capital barrier—at least against those plagues of public gardens, the persons who appear to take a delight in walking across borders, &c., sometimes to save a few yards' walk, but chiefly for no reason except that it is wrong.

A plant close by, and still in the same border, should be much more cultivated than it is, if only for the fact that it requires so little attention. It is that tall flag-like plant, and is known as Adam's Needle (*Yucca gloriosa*). The spike of white flowers produced by this plant is really beautiful. It does not produce seeds outside of its native home unless artificially fertilised, and the interdependence of the floral and insect worlds is so well illustrated by this, that the words of the great botanical authority, Anton Kerner von Marilaun, are well worth quoting. He says—"Certain small moths which visit the flowers of Yucca bring the pollen to the stigmas and force it into the stigmatic orifices in order that mature fruits and seeds may be produced from the rudimentary fruits, a result which is indeed a matter of vital importance to those moths. For the moths lay their eggs in the carpels of the Yucca, and from the eggs larvæ are developed, which live exclusively on the seeds of this plant. If the Yucca were not fertilised, and did not develop any fruit, the larvæ would die of hunger." Truly a wonderful arrangement! This is not by any means an isolated case of the kind. Very many plants are persistently unfertile outside of their native countries, not because the climate does not suit them, but simply because the proper kind of insect is not present to secure fertilisation.

At the base of the Yucca and slightly in front you will notice some plants having oval leaves, about $2\frac{1}{2}$ inches long, with a whitish blotch in the centre. This is called the Telegraph Plant (*Desmodium gyrans*). It got its name of Telegraph Plant from the old semaphores which were formerly used for transmitting messages across country, and which consisted of an upright post with two arms, the changing positions of which indicated the message. If you look at the bases of the leaves of this plant on a bright sunny day, you will see that there are two little leaves projecting from the base of the larger one. These are known botanically as stipules.

Watch them for a time, and you will be astonished to see them suddenly change their position with a little jerk as if they were alive, and not feeling comfortable as they were before, had determined to try another position. After a short time they change with another jerk, sometimes one at a time, sometimes both together. And thus they go round and round, the stipules all over the plant standing at all possible angles with the leaves. It is a native of India. To enter fully into a recital of the causes which produce these movements, spontaneous and otherwise, observed in the leaves of many plants, would take up a good deal of space, and be somewhat dry reading; but briefly it may be said to be caused by the vessels on one side of the small glands at the bases of the leaf-stalks becoming filled with fluid under atmospheric or other stimulus, and thus turning the leaf over to one side, as if you were to place a bladder under one edge of a box as it stands on the floor, and then pump water into the bladder. The box will heel over. This is a crude description, but it roughly illustrates the process, and the subject is a highly technical one. This plant is readily propagated by seeds, which it bears in profusion.

Close by is a plant which hails from Western Africa, and which is remarkable for the possession of a very strong and serviceable fibre. It is called the Bowstring Hemp (*Sansevieria guineensis*). There are several species of this genus, all of which produce strong fibre. *Sansevieria cylindrica* grows close by, and, as its name implies, the leaf is cylindrical, like a riding-whip. It comes from Angola, and its fibres make a capital cordage. The broad-leaved species are distinctly ornamental, and are not too particular as to where they grow. Shade and sunshine appear to be all one to them, and they take hold and flourish in rocky ground or in ground impoverished by the roots of trees. It is quite easy, too, to propagate them, which is done by simply chopping off a piece having some roots and planting it. This in its turn will soon produce plenty of off-shoots.

Leaving the flight of steps on our right, we pass on to the next border (L. 10, 11). Note the Philodendron (tree-lover); how it grows quite freely about the giant fan palm, sprawling among the old bases of the leaf-stalks. It was formerly thought necessary to grow these tropical creepers under cover here, but they are found to succeed as well or better out of doors.

Visitors from other colonies and from Europe will be interested in noting, on a huge palm close by, young staghorn ferns in every stage of growth, from the small shield-like blotch of green membrane, which arises from the wind-carried spore in the first instance, to the complete plant. Did you ever examine the brown blotches which may be seen on the backs of most ferns? If not, get a good magnifying glass and look at them. You will see myriads of little pellets—spores, they are called—arranged in a variety of ways in a number of curious receptacles, the shapes of which are very various. Anyone can raise ferns from spores in this country with a box and a pane of glass, a little supply of peat, and a big supply of patience. The peat may be the rotting bases of old staghorns. You put some in your box, not broken up too fine. When you find that the fern frond, when shaken over a sheet of white paper, deposits a brown dust, that is the time to sow the spores—the dust which is left on the paper. Simply shake it over the peat. No cover is required. Put your pane of glass over the box, keep shaded and damp, never allow to get dry, and in due course you will see first little expansions of green, then young fronds, and, finally, your young ferns can be removed one by one, and having kept them close for a week or two you may take them to your shadehouse and let them start life on their own account.

If you look up towards the shade garden you will note some plants which always rivet the attention of southern and other visitors. These are the plants with flaunting scarlet leaves in large heads, making a brave show. It

is known as the Poinsettia, or Flor de Pasqua, and hails from Mexico. It grows up to about 2 feet high. The gaudy leaves are not the flowers. They are signals extended to attract the attention of insects. If you look closely at the flower you will see that there is a little cup on one side, and this contains, when the flower is in its perfection, a drop of very sweet honey. You will see, too, a little thrice-divided organ, turned back something like the feathers which are worn in the bonnet of a Highland soldier. The insect is attracted by the fiery signal. He knows of old that there is a store of nectar there, but he cannot sip without straddling and tumbling over the thrice-divided style. He has just left another flower of the same species, and the pollen-grains thereof are adhering to him. Some must be left on the style. That is all the flower requires. No more honey is distilled. No more insects visit that flower. The style grows upward, and soon, beneath it, is produced a little receptacle of seeds, and the whole mystery of germination and plant life begins all over again.

This plant is most easily propagated. It is simply necessary to put in cuttings of the ripe wood when the plant has ceased flowering. They may be put in where they are intended to flower. These brilliant plants are within the reach of everyone.

Tropical Industries.

COFFEE IN QUEENSLAND AND OTHER PARTS.

By JOHN DANSEY,

Manager, Mackay Coffee Estate Co., Ltd.

No. 2.

As soon as possible after each bed has been sown, a temporary wooden frame should be erected over the beds, at a height of from 18 inches to 2 feet, over which should be spread a covering of hessian or palm leaves. This is specially advisable in the very early stages of germination, otherwise the heat of the sun will cause the germs to get baked, and the seed will be rendered useless. Numbers of cases of failure have been brought to my notice through the non-observance of providing suitable shade as the seed is about to germinate. These frames should be so constructed as to allow the covering to be removed every night, and replaced in position as early as possible after sunrise.

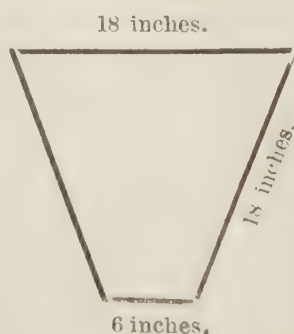
In Ceylon and other coffee-growing countries it is not generally found necessary to provide shade over the seed beds, the rainfall in such countries being generally sufficient to keep the ground in a state of moisture, whilst the sun does not appear to have the same baking influence as it has in Queensland.

Until the seedlings begin to show above ground, from four to five weeks will elapse, during which period the beds should be carefully watered at least once in every forty-eight hours. As the young plants reach the height of from 3 to 4 inches, and begin to throw out their first pair of laterals, the covering should by degrees be removed, and finally, as the plants get to the height of 6 inches, abandoned altogether. By this mode of treatment the plants are allowed to become hardy, and better able to resist the powerful rays of the sun when removed to the field.

When they obtain a height of from 10 to 12 inches they may be said to be fit for planting out, and in doing so great care should be exercised in selecting only strong and healthy plants with straight and undamaged tap-roots. The transplanting should not take place before the planter has satisfied himself that the rainy season has set in, otherwise shading and watering the young plants will have to be resorted to in order to ensure their growth, and this is not only tedious, but expensive. In transplanting, it is advisable to use flat-bottomed baskets in which to carry the young plants from the nursery to the field, and as much earth as possible should be retained round the roots, care also being taken that the latter are always kept well covered with a wet cloth, bag, moss, or some substance of like description, and never at any time exposed to the sun's rays.

In laying out the land for a coffee estate the method invariably adopted in Ceylon is, supposing the land to be heavy scrub or jungle, to brush the land thoroughly first, then to fell all standing timber to a height of not more than 3 feet from the ground, to top off all branches of the latter, getting them to lie as close to the ground as possible. After an interval of from three to four months the land should be fit for burning off. Should the burn be complete, nothing scarcely will remain on the land but the trunks and stumps; it is then ready for lining, which should be done with great precision and regularity, adding thereby much to the general appearance of the estate, and also to the easy working of it at crop and at other times. With regard to the distances at which coffee-trees should be planted out, people are wont to differ. In Ceylon and Southern India 5 feet by 4 feet, 5 feet by 5 feet, and 5 feet by 6 feet are the distances generally in vogue, the latter in most instances being adopted; but in this part of Queensland at least, where trees grow with such vigour, I would recommend distances apart of 7 feet by 6 feet, which I fancy will be found, in the long run, to be nearly as possible the correct distances at which trees should be planted out.

Though the method of dibbling the young plants into the soil is at odd times resorted to, it cannot in any way be recommended as a safe and practical way of planting out, except, indeed, where the soil is of an exceptionally friable nature, and even then the young plants seldom reach that degree of robustness characteristic to those planted in holes. It is the latter method I pursue myself, and the one I would recommend others to follow. Holes should not be less than 18 inches across the top, 18 inches deep, and about 6 inches at bottom—flower-pot shaped, in fact, as shown in the diagram:—



When dug, they should be left exposed to the atmosphere for a week or two previous to the filling in taking place, which consists in scraping into the hole from around it all the top soil to a depth of from 2 to 3 inches, care being taken that all stones, roots, or any injurious particles are removed. Press the lot firmly into the hole by standing on it, keeping it full to the brim and flush with the land. The holes are then fit for the reception of the young plants, though, should time allow, it is advisable to let the holes remain as they are for a week or ten days, until their contents have thoroughly settled down.

Plants and Stumps.—The beginner, who at the same time as he is clearing his land, is laying down his first nursery, has no choice in his first year but to plant out his clearing with young plants. He will do a wise thing, however, whilst he is about it, to make his nursery of sufficient dimensions and carrying capacity not only to afford him all the young plants he requires for his first year's planting, but also to have remaining in his nursery sufficient plants to grow up, and be cut down to stumps, with which either to plant up his second year's clearing or to supply vacancies at times when it would not be practicable to put out young plants. To form stumps, it is only necessary to allow the young plants in the nursery to grow up at their own sweet will, until they are from sixteen to eighteen months old. The top is then cut off at about 6 inches from the ground, the tap-root and laterals trimmed, when the stump is ready to be put out. In parts of Queensland where the planting season is somewhat uncertain, where a few wet days may be succeeded by days of bright sunshine and intense heat, the stump has an immense advantage over the young plant, inasmuch as the latter requires, more or less, a fortnight of a moist atmosphere before it can be said to have taken a firm hold of the ground, and to be capable of resisting the powerful influence of a tropical sun; and though the weather, to the planter's mind, may appear all that could be desired for the purpose of planting out, the chances are, in these very erratic wet seasons of ours, that the weather may all of a sudden turn from one of rain to a cloudless sky, in which case the young plants will assuredly sicken and wither away, whereas stumps can be practically planted out at all times of the year, providing always it is not too wet, from one to two months previous to the wet season setting in being the most preferable time. They are slow in shooting out at first, but in nine cases out of ten will beat young plants in growth and vigour before either are twelve months old.

Incredible though it may seem, there are to be seen, within a few miles of Mackay, some hundreds of young and handsome trees, which were put out as stumps in December, 1896, and now, therefore, one year and nine months old. These trees are now fully 4 feet high, in great heart, and bearing heavily. Young plants put in at the same time will not show spike (flower) for another three months to come, which speaks volumes in favour of stumps *versus* plants as far as Queensland is concerned; and so satisfied am I on this point that over 100,000 plants are being allowed to come on in this company's nurseries, all of which are intended for stumps, and which will be ready for planting out by the end of the present year.

Staking.—It often happens that when the young coffee has attained the height of about 2 feet, and is at all exposed to high winds, that by swaying to and fro it will cause a round hole to be formed round the stem, which, as soon as the rains set in, will fill with water, and this getting to the roots will cause the latter to decompose, finally killing the tree altogether. It is therefore necessary in cases like the above to resort to staking, which can be carried out as follows:—

Take any stick of about 3 feet in length, pointed at one end, and drive it firmly and slantwise into the ground, laying it across the tree and in the direction of the prevailing winds; tie loosely, with a piece of rag, the tree to the stake, and about half-way up the latter.

Topping.—This consists in cutting off the top of the tree to prevent it from attaining a greater height than it would otherwise. This operation should not be performed until the brown bark has attained the desired height; if cut in the green wood, the top is sure to die back to the brown, and thereby cause serious loss. When topping it is also found necessary to remove one or other of the top primaries as shown in Fig. I., as it frequently happens that, by leaving both standing, the weight of crop and of the primaries themselves is liable to cause the tree to split in two. In Ceylon, topping the trees at 3 feet 6 inches in very sheltered situations is generally resorted to, but 3 feet and 2 feet 6 inches are not at all uncommon. In Queensland, however, where the trees seem to grow and bear out of all proportion to Ceylon and India, I would recommend a height of 4 feet 6 inches to 4 feet 9 inches in very sheltered positions, reducing this height to 4 feet and 3 feet 6 inches, according to the elevation of the land and its exposure to winds.

Topping causes the tree to spread out to a great width and assume a much more vigorous appearance than when allowed to grow to any height, and possesses, besides, the immense advantage of enabling the pickers and others to work round and about all parts of the tree without the inconvenience of providing themselves with step-ladders, as is commonly done in the Brazils. In topping, a stick is generally used, which, having been cut down to the desired height, is placed inside the tree, and near the stem. The top of the tree is then cut level with that of the stick. By this means the trees are all reduced to the same height, which adds much to the general appearance of the plantation.

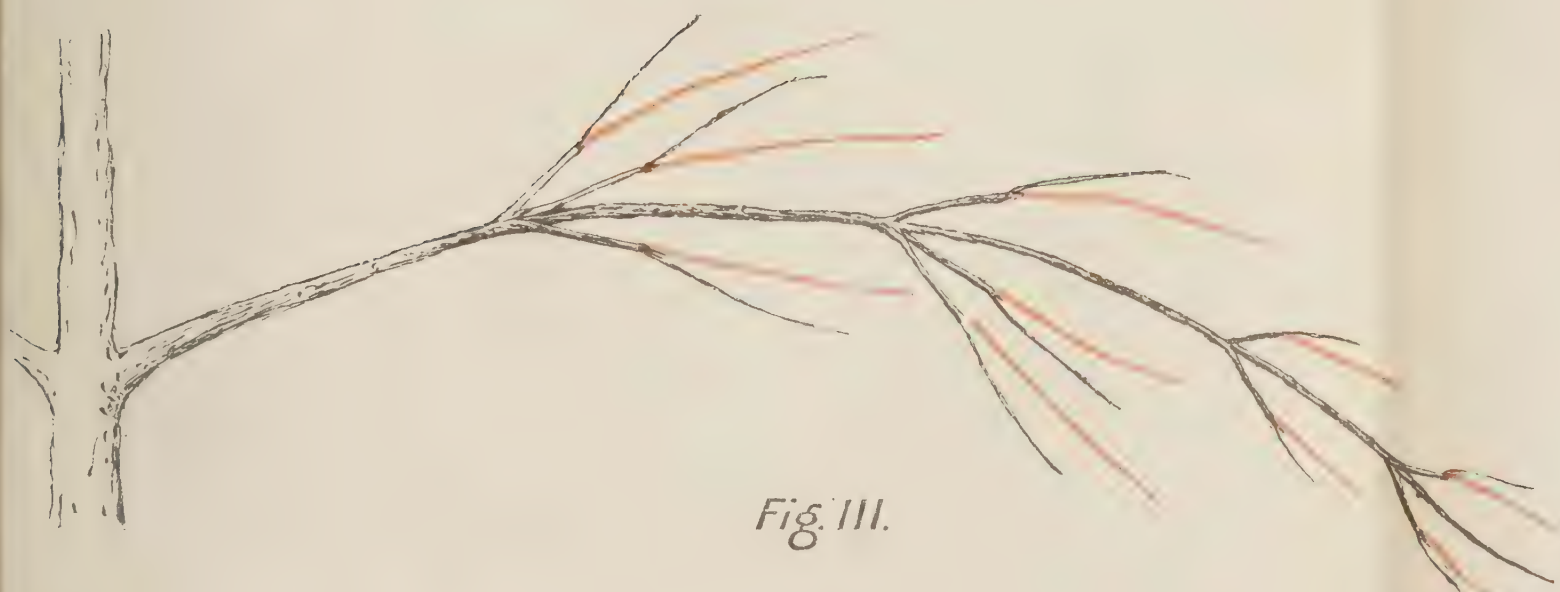
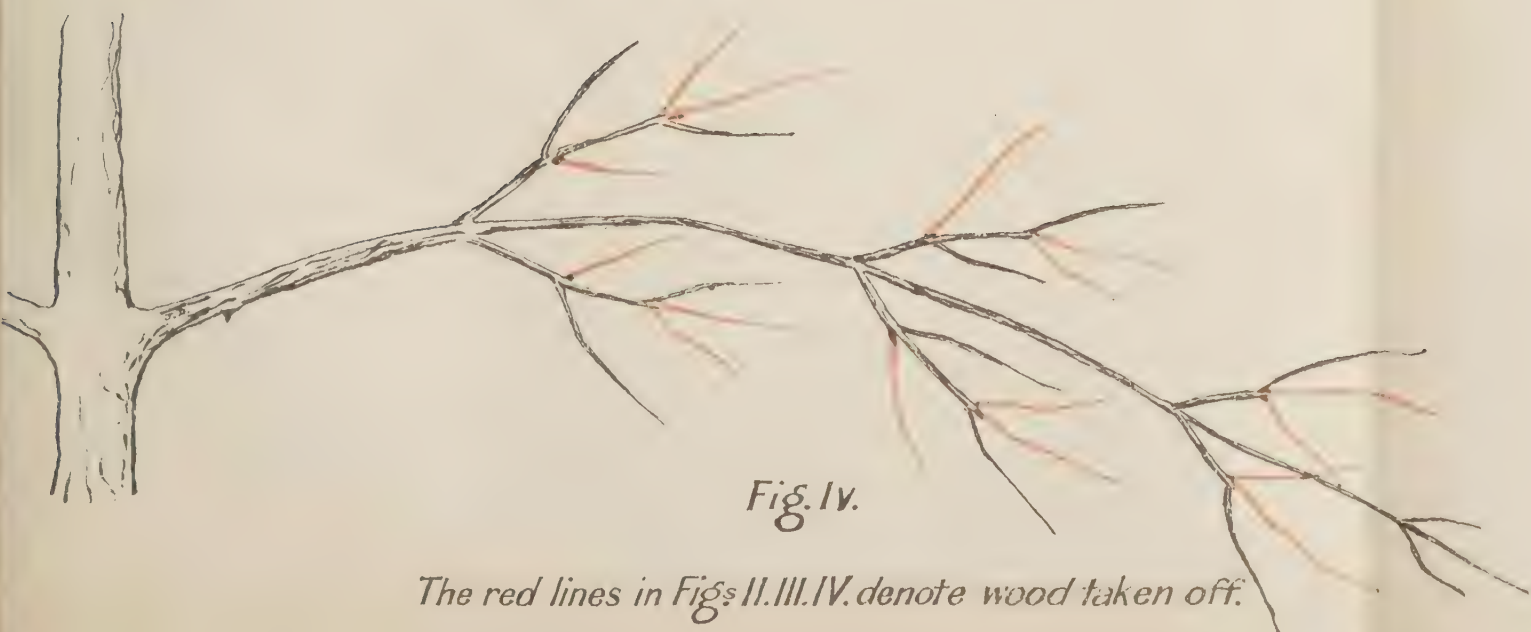
Handling and Pruning.—As it is the planter's main object to keep his trees strong and healthy, handling should be begun at as early a stage as practicable. This consists in freeing the stem itself of all suckers and also the primaries to a distance of a span around the tree, as shown in Fig. I.; next examine carefully the primaries, and as you run your hand over them remove all secondaries having a tendency to grow back towards the stem, or in a perpendicular way, leaving only to grow such as run more or less parallel with the primary (*vide* Fig. II.). Secondaries will often be found to grow in twos and threes from the same joint. It is very desirable under these conditions to remove all but one, or two at the most, no harm being done by leaving two, provided they grow in a proper direction and do not overlay one another, but in this, as in many other instances with regard to handling and pruning, the planter should to a large extent use his own discretion. Some planters there are who prefer leaving all the wood on for the maiden crop, whether the secondaries left are contrary to the position they should occupy or not. I question very much whether by doing so a heavier percentage of fruit would be obtained, whilst I am quite sure that it weakens to a great extent the young tree, besides becoming a source of enormous trouble when, after crop, the late-bearing wood has to be removed and the tree put into shape again.

If the operation of handling is seriously taken in hand from the first, it will help to make matters very much easier for the pruning. The latter is at all times a very important function, as on it entirely depends the productiveness of the tree and the quality of the coffee obtained.

In pruning a tree, all dead wood, or wood that has borne fruit, should be removed, for the same wood that has given fruit this year will not do so again next; consequently if, to the planter's mind, the secondary which has to be pruned down is not of a very vigorous growth, it should be cut down to the first living eye only, as shown in Fig. III., allowing one tertiary to bear fruit for the coming crop. On the other hand, should the wood be strong enough to bear them, two tertiaries may be allowed to remain as shown in Fig. IV., pruning down to the second living eye, and removing end of secondary and alternate tertiaries. Great care must be taken here not to allow any wood to remain that is at all likely to at any time form a crow's nest, retarding thereby others from bearing fruit, and becoming at once a serious

Plate XLIV.



*Fig. II.**Fig. III.**Fig. IV.*

The red lines in Figs II. III. IV. denote wood taken off.

impediment to the free circulation of air between the branches; the primary itself should never be cut unless the part to be operated upon is dead, or has by some means or other become so seriously damaged as to require its removal. As pruning trees has the effect of making them throw out quantities of new wood, it will be found necessary to go over them and handle them again, within two months after the pruning has taken place, and remove all suckers from round about the eye nearest to the parts pruned off, also along the stem and primaries, leaving only such wood as is required for the forthcoming crop and the one following it. The utmost care must therefore be exercised as to what wood to remove and what to allow to remain, at the same time keeping the tree as symmetrical as possible, and yet not at the expense of reducing the crop by so doing. It is in the pruning of the tree that the planter possessed of knowledge and dexterity comes in, the future of the plantation and its bearing capabilities being entirely dependent on this work being judiciously carried out.

With regard to the season of the year at which pruning should take place, again planters often differ. Some there are who are wont to put the knife in immediately after the crop has been gathered; others do not care to begin until the blossom is in spike, or nearly so; others not until the blossom has set. All seem to offer more or less, in one way and another, distinct advantages or disadvantages, but the general custom in vogue amongst old hands is to prune after crop, for by doing so old wood and wood which has borne is at once removed, and what remains benefits to the full extent of all the vitality left in the tree.

Not pruning till the blossom has set has certainly its advantages, if only for the reason that the pruner sees at a glance what to leave and what to take off; but this, again, is counterbalanced by a far greater evil, inasmuch as the pruner will often be disinclined to take off wood which is showing fruit, though by doing so he is immensely increasing his labours for the following season, in addition to putting his tree out of shape; again, when going through and around his tree, he is very apt to knock off a considerable amount of young green berries, consequent on the young wood not being in such a vigorous state as when pruned early.

Pruning as the blossom is coming into spike is preferable to the latter, but I do not consider that either method can in any way approach pruning after crop, for the reasons given above, and it will be palpable to anybody that as manuring takes place as soon as practicable after the crop has been gathered, so should pruning begin, for as the manure is placed in the ground to restore as much as possible to the tree the vitality lost by bearing a heavy crop, so all useless wood, dead or alive, is removed, in order to concentrate as much as possible the renewed vigour imparted to the tree by the application of the manure.

(To be continued.)

COFFEE-PICKING AT CAIRNS.

THE question of harvesting coffee cheaply has been debated ever since the attention of agriculturists has been turned in the direction of coffee-planting. Many people have been deterred from entering upon the industry by statements that the cost of picking would take away any margin of profit, even if the crop were sold at 1s. per lb.

The Rev. E. R. Gribble, who is in charge of the Aboriginal Mission Station at Myola, has sent several aboriginal "boys" to pick the crop on Hambleton Plantation. The experiment seems to be a success. Mr. Gribble, writing to Mr. E. Cowley, Manager of Kamerunga State Nursery, says that the

boys work with a will, and that the work is thoroughly well done. Mr. Cowley has kindly forwarded us the results of three days' work by these natives, which are as follow:—

—					Work Commenced.	Work Ceased.	Result.
1898.							Lb. oz.
15 June*—							
Morning ...	...	...	...	...	9 a.m.	1 p.m.	220 0
Afternoon...	...	...	...	...	2.15 p.m.	5 p.m.	169 12
					Total for the day ...		389 12
16 June†—							
Morning ...	...	...	...	...	8 a.m.	11 a.m.	339 4
Afternoon...	...	...	...	...	2 p.m.	3.30 p.m.	169 8
					Total for the day ...		508 12
17 June—							
Morning ...	...	...	...	...	7 a.m.	12.30 p.m.	316 8
Afternoon...	...	...	...	...	2 p.m.	4 p.m.	262 14
					Total for the day ...		579 6
18 June‡—							
Morning ...	..	...	...	...	7.15 a.m.	10.30 a.m.	254 4
" ...	...	..	...	...	10.30 a.m.	11.30 a.m.	56 8
" ...	...	...	...	...	11.30 a.m.	12.40 p.m.	113 0
					Total for the morning ...		423 12
20 June§—							
Morning ...	...	...	..	...	7.10 a.m.	12.15 p.m.	290 0
Afternoon...	...	...	...	..	2 p.m.	5 p.m.	233 0
					Total for the day ...		523 0
21 June—							
Morning ...	...	...	...	...	7.15 a.m.	12.30 p.m.	395 8
Afternoon...	...	...	...	...	2 p.m.	5.30 p.m.	296 8
					Total for the day ...		692 0
22 June—							
Morning ...	...	...	...	...	7.30 a.m.	12 noon.	388 4
Afternoon...	...	...	...	...	2 p.m.	5.30 p.m.	292 0
					Total for the day ...		680 4
23 June—							
Morning ...	...	...	...	...	7.30 a.m.	12.40 p.m.	367 4
Afternoon...	...	...	...	...	2 p.m.	5.30 p.m.	360 0
					Total for the day ...		727 4
24 June—							
Morning ..	...	...	...	...	7.45 a.m.	12.30 p.m.	430 13
Afternoon...	...	...	...	...	2 p.m.	5 p.m.	282 8
					Total for the day ...		713 5

* Nine boys.

‡ No work in the afternoon.

† Eight boys full time, one boy (cook) half time.

§ Eight boys only picking, one boy ill.

Mr. Cowley mentions that this is the harvest month (June). Earlier or later pickings would not result in so heavy a weight picked. Taking the three first days together, we get a total of 1,477 lb. 14 oz. as the weight of berry picked by $8\frac{1}{2}$ men in $18\frac{3}{4}$ hours, equal to nearly 79 lb. for one man working eight hours a day. At $\frac{1}{2}$ d. per lb. (the price paid to the aboriginal pickers), supposing a man to work steadily and pick at a uniform rate, he could earn 3s. 3 $\frac{1}{2}$ d. per day but we are told that he could not pick so much during the early and later portion of the crop time, so we may put his average earnings

down at 2s. 6d. per day. Now let us see how this pays the planter. Mr. Cowley estimates the return of pure commercial coffee bean at 2·97 oz. from 1 lb. of ripe berries.* Let us value the commercial bean at 9d. per lb. Taking the average day's picking by one man at 60 lb. of berry, this gives, at the above calculation, 180 oz. or $11\frac{1}{4}$ lb. of commercial coffee, which at 9d. per lb. is worth a fraction over 8s. 5d.

From this we deduct the wages of the picker, 2s. 6d.; and we now have 5s. 11d. to represent the profit of the man's labour to the planter. Out of this 5s. 11d. has to come the cost of clearing, planting, and cultivation of the land, interest on outlay for over three years, cost of manufacture, interest on outlay for machinery, cost of bags, cartage, freight, insurance, commission, and a few other sundries.

At 6 feet by 6 feet apart an acre will contain 1,201 trees. Allowing 3 lb. of clean marketable coffee to each tree, we get 3,603 lb. per acre. At the above calculation of about 5 lb. of berry to 1 lb. of clean coffee, this would mean that 18,015 lb. of berry would have to be picked. The cost of the labour for picking, at $\frac{1}{2}$ d. per lb., would reach £37 10s. $7\frac{1}{2}$ d., and the value of the commercial bean produced £135 2s. 3d.; from which we deduct picking expenses, leaving £97 11s. $7\frac{1}{2}$ d., from which all the above-mentioned items have to be deducted.

As, however, paper calculations rarely are borne out by practical results, a considerable reduction may doubtless be made on the figures denoting returns.

* *Queensland Agricultural Journal*, Vol. I., page 455: "Coffee-growing in Queensland," by F. Hepburn.

Pisciculture.

THE CERATODUS.

PISCICULTURISTS will be glad to learn that Mr. D. O'Connor of Duporth, Oxley, has been successful in landing four specimens of the Queensland *Ceratodus* in perfect health in London. Mr. O'Connor, it will be remembered, advocated, in this *Journal*, the introduction of the Gourami of the Mauritius. (Vol. I., Pt. 4, p. 340), which he described as most delicious fish, easily transported, being very tenacious of life, and certain to do well in Queensland waters. An enthusiastic pisciculturist, he determined to make an attempt at introducing the *Ceratodus* into England, and with this view procured four live fish from the Mary River. These were placed in specially prepared tanks on board the "Duke of Devonshire," which left Brisbane on April 16. The fish were anxiously watched by Mr. O'Connor during the voyage home, and his care has been rewarded by complete success.

Having succeeded in this venture, he intends, on his return, to obtain living specimens of the Gourami at Java, and will no doubt have the satisfaction of seeing this fish multiplying in Queensland waters.

General Notes.

HOT-WATER TREATMENT OF SEED WHEAT.

MR. J. R. MARTIN, of Cawdor, writes in reference to an article appearing in the *Journal* in May last on the above subject:—

I have never tried the hot-water method as a remedy against smut, but I have used bluestone for twenty years, and have never known it to fail, it being a sure preventive of the disease. The method I adopt is to place the wheat in a wooden tub—a hogshead cut in two makes a good pickling vessel. I fill the tub with the seed to within 6 inches of the top, and then pour in water, completely covering the wheat. To each bushel of wheat I take $\frac{1}{4}$ -lb. of bluestone, or 1 lb. to a bag, powder it fine, and dissolve it in boiling water. I pour this on to the wheat, stirring well with a piece of batten, and then leave it in the pickle for three hours. If I wish to sow at once, I take the wheat from the tubs at the end of that time and put it in bags. If I do not require it immediately, I spread it out on the barn floor, mixing a little slacked lime with it. In this way it will keep for a long time.

Last year I tried an experiment with this pickle on barley and oats, treating the grain precisely in the same manner as the wheat. The result was that I had no smut in the crop raised from the pickled seed. I tried some without any treatment whatever, and the crop was full of ball smut. There are other methods of applying the bluestone, such as dissolving the crystals and sprinkling the wheat spread out on the floor, and turning it over during the sprinkling with a shovel; but I do not think this method is as good a preventive as pickling, as some of the grains are sure to miss contact with the bluestone, and then, in all probability, the crop would be more or less affected with smut. I do not say decidedly that bluestone will not destroy some of the grains, but this I can safely certify—that I always had a fair crop from land sown broadcast with three-quarters of a bushel of seed to the acre, and it was very seldom affected by smut, and I have grown several varieties of wheat with the same result.

CANE DISEASE IN INDIA.

THE disease in sugar-cane, which has been prevalent in Madras, forms the subject of a report by Dr. Bourne, which has recently been issued. The report ascribes the evil to a fungoid growth having all the symptoms characteristic of *Trichosphæria sacchari masse*, which has recently threatened to extinguish the sugar industry of Barbados. Dr. Bourne finds both the root fungus and rind fungus present, whereby great damage is being done; and says that, unless some measures to check its progress are adopted at once, matters will go from bad to worse. His inquiries show that the disease is pretty widely spread along the whole coast, even to Ganjam, and has been gradually coming on for years. Each plantation he examined showed the disease in all its stages—that is to say, contained plants which had been attacked at different periods. The report shows that some of the methods adopted by the ryot are calculated to spread the spores as widely as possible. His methods of planting, and more especially of raising a second crop where the disease is prevalent, are almost certain to ensure its recrudescence in an aggravated form. As a remedial measure, Dr. Bourne recommends that all land under sugar-cane this year should be sown with paddy; all cane roots left in the ground wherever there has been any disease being taken up and burnt; and all crushed cane, old leaves, and other litter to be burnt at once. Where new gardens are being planted, "tops" from a perfectly healthy area should be secured. As this will not be feasible

this year, the existing "tops" should be carefully examined by cutting across at each end, and any showing red spots in the flesh should be scrupulously rejected and burned. Next year it will be necessary to consider the feasibility of importing seed or taking other measures. It is too late to do so this year.

—*Engineer.*

WHEAT IN THE UNITED STATES.

REPORTS from the Spring wheat States of America show that sowing has made great progress, under favourable circumstances, and that a good deal of early sown wheat has come up well. The area of the crop has been generally increased, in consequence of the inducement offered by high prices. The condition of the winter crop in most of the Atlantic States is also declared to be satisfactory. Thus, so far as a large area and a good start go, there is every reason to expect a great production of wheat in the United States next harvest, in spite of the poor prospects in California, though results, of course, will be largely dependent upon the character of the weather for the next two or three months.

TOMATOES.

MR. W. H. HITCHCOCK, of Hill View, Tungamull, has grown some very fine tomatoes last season. The winter was mild, and the plants survived through it, and bore large quantities of fruit (the *Ponderosa* variety) during the summer months. Tomatoes weighing 1lb. each were common, while one especially large weighed 22 oz. The vines are still fruiting. Mr. Hitchcock is so satisfied with his experience of tomato-growing that he intends to plant largely this season.

SURPRISE OATS.

WE have received the following notes from Mrs. F. M. Martin, mycologist, "Weebar," Drouin, Gippsland, concerning a valuable variety of oats which Mr. Martin obtained in Canada. If what is reported about this particular cereal continues to be borne out by results, it should be a good thing for the Queensland farmer:—In reply to your memorandum of the 26th February, *re* Surprise oats. Seeing a notice in Canadian publications when we were looking out for a better class of oats than we were able to obtain in Victoria, and having tried in vain for some years, we thought of getting it. Some time afterwards it was advertised in the Melbourne *Argus* as selling at a much higher rate in America than any other oats. We decided to send for it, and were greatly pleased with it on arrival. We sowed $1\frac{1}{2}$ acres, but, owing to the season being the worst yet known in Gippsland, we only gathered $18\frac{1}{2}$ bags. There has been no crop we can hear of in the district better for straw. Many old settlers came to see it, and wished to buy. A man bought all we could spare at 10s. a bushel before it came into ear, we reserving the right to all we wanted to plant, and we are so satisfied, we are planting *all*, and sold or disposed of none, although we have had applications from all the colonies except South Australia, also from West Africa.

SOURSOP WEED (*OXALIS CERNUA*).

THIS rather pretty-looking flower has become a great pest in many gardens around the city. We are asked how it is to be got rid of. Although not nearly so difficult of eradication as nut-grass, yet so many hundreds of minute bulbs gather round the parent bulb that the more the ground is stirred the greater the area infested. We know, however, of no destructive agent which could be applied to it in a flower garden without at the same time injuring the flowers. The surest way is dig up the bulbs on the clear ground and pick them off, and amongst the flowers to constantly pull up the leaf-stalks. By repeating this latter process, in the course of a single season, the nuts or bulbs will shrivel up from want of nourishment, and the smaller ones will come nearer and nearer to the surface till at last they can be pulled up attached to the flower-stalks.

PICKLE FOR MEAT.

THE following is a good receipt for curing pork or beef:—To each gallon of water, take $1\frac{1}{2}$ lb. salt, $\frac{1}{2}$ lb. sugar, $\frac{1}{4}$ -oz. saltpetre, and $\frac{1}{2}$ -oz. pure potash. In these proportions, the pickle can be increased to any quantity desired. Boil until the scum from the sugar has risen to the top, and has been skimmed off. When cold, pour it over the pork or beef to be cured. The meat must be well covered by the pickle, and ought not to be put down until two days after killing, during which time it should be lightly sprinkled with powdered saltpetre to remove the surface blood, and leave the meat fresh and clean. In curing beef, the pickle will have to be drawn off, boiled and skimmed three times, after which it will remain clear; but for pork, one boiling is generally sufficient. It also requires more pickle for beef than for pork on account of the waste in boiling.

This recipe needs to be tried but once to be appreciated, as the meat is unsurpassed for sweetness, delicacy, and colour. It requires to be kept in a clean, sweet barrel.—*South Australian Journal of Agriculture.*

TO DESTROY WILD MUSTARD.

THE *Chronique Agricole* du Canton de Vaud (Switzerland) says:—

We again draw the attention of agriculturists to the method of destroying wild mustard (senèves) in wheatfields by means of spraying with a solution of sulphate of copper (blue vitriol).

We would advise those who wish to try the remedy to choose the time when the mustard covers the ground, when it is young, tender, and has scant foliage. The longer the work is delayed, the harder and more resistant the plant becomes. The treatment will, however, succeed fairly well even when the plants are in flower. The spraying should be done on a fine morning, when a hot day and bright sun are likely to supervene. Should rain occur shortly after spraying, the sulphate would be washed away and the weeds would require a second treatment.

The strength of the mixture should be 5 per cent. of sulphate, 95 per cent. of water. It requires 1,000 litres (about 222 gallons) of liquid to spray 1 hectare ($2\frac{1}{2}$ acres). The remedy is applied by the use of any spraying instrument, which will do the work so lightly that the mixture will not run to the ground, but remain on the leaves.

Some experimenters have tried sulphate of iron (green vitriol) in the ratio of 15 to 30 kilograms (33 to 66 lb.) per 100 litres (22 gallons), and, it would appear, with good results.

We would remind the farmer that this treatment can only be applied to wheatfields or to fields on which cereals generally are grown. These suffer little from being washed with a copper solution, but a crop of potatoes or beets would infallibly be destroyed by it.

A WRITER in the *Scottish Farmer* says that, although copper sulphate solution was the substance first used by the investigator who discovered this mode of eradicating charlock, iron sulphate has since been found to answer as well, and the cost is much less. A 15 per cent. solution is recommended, which must be applied by means of a spraying machine. The method had, however, not been tried in Scotland at the time of writing (May 21).

[We shall be glad to hear of the results of any trials made in the direction of eradicating the wild mustard so prevalent in our Queensland wheatfields.—Ed. *Q.A.J.*]

NOXIOUS WEED—THE BLACKBERRY.

“GOING-A-BLACKBERRYING” in our young days in the old country was a treat greatly enjoyed by all youngsters, and even by grown people. “Going-a-black-berrying” in Australia appears to be a very different kind of enjoyment. According to a correspondent of the *Sydney Stock and Station Journal*, the

blackberry is making serious inroads in some parts of New South Wales. He says:—"In the Wingicarribee or Robertson district it is making terrible headway, and in that rich stony soil it will cost many thousands of pounds to clear it off. I think the day is not very far distant when it will be found that a small farm clear of noxious weeds and scrub will be worth more than a large one in the state that many good properties are being allowed to get into. No one knows what it is to eradicate blackberries till they try it."

The blackberry, we understand, finds as congenial a home about the Stanthorpe district as does the sweet briar about Tenterfield. It may be just as well for residents and divisional boards to keep an eye on this exuberantly-growing bramble.

PIG MEMS.

(From the Farmer and Stock Breeder.)

REMEMBER to feed profitably, it must be done with regularity and care.

PROFITABLE feeding will not be secured by indiscriminately filling the troughs.

SMALL quantities given often will have far greater results.

THE keystone of successful pork production lies in the treatment of the young pig.

STARVED or pinched after weaning means little or no profit, but, on the other hand, generous and judicious feeding ensures success.

Avoid cheap, indigestible foods, which prove, more often than not, both costly and expensive.

WATCH the local requirements, and study your buyers' wishes, and thus produce the desired requisites to meet your local market.

THIS *modus operandi* may not be to your mind correct, but, if followed, will doubtless prove profitable, by the fact that there is always more competition realised for articles that fulfil the local demands than those which do not.

NEVER offer for sale pigs unless they are of first quality.

A RUBBER EXTRACTOR.

ONE of the objections to the method of collecting rubber by aborigines, whether in New Guinea or in other rubber-producing countries, is the crudeness of those methods. All sorts of extraneous matter are mixed with the product, and lengthy processes have to be adopted to turn out a pure article in first-class marketable condition. We seem to have now arrived at a point when invention will master all such difficulties. At an Agricultural Exhibition at Trinidad recently held in that colony, a most interesting exhibit was to be seen in working order in the Botanical Department in the shape of a new machine for the extraction of rubber from the *latex* or milk of the *Castilloa* tree. In two minutes the rubber was separated, and then was set to dry. In the space of about three hours, sheets or slabs of fine, clear, marketable rubber were produced, free from the usual amount of proteid and albumenoid matters which are usually found in rubber produced by the ordinary process.

TRIAL OF A POTATO DIGGER.

A GREAT deal of interest at this time of the year is naturally centred in potato digging, and any implement which can facilitate the lifting of the tuber without in any way damaging it is certain to command a considerable amount of attention. This proved to be the case at the trial of Jack and Son's patent "Caledonian" potato digger, which was held recently at Mr. B. S. Oppenheim's farm, Sassafras. The trial proved very successful, very few potatoes being injured. As an instance of the saving in labour effected, a dozen men were kept fully occupied in trying to keep up with the machine bagging on a crop yielding close on four tons to the acre.—*Australian Exchange*.

HOW HORSES DRINK.

THEY ARE VERY PARTICULAR.

EXPERIENCE shows that horses must not be allowed to drink freely before hard riding or driving; but this, too, is in keeping with their natural, or perhaps we should say their acquired, habits when originally wild. If, as is probably the case, the wild horses lived in the Central Asian steppes, like the kiang or Central Asian wild ass, water (says the *Spectator*) could never have been plentiful; and, like the African antelopes and zebras, the originals of the species probably drank only once in twenty-four hours, going to considerable distances to obtain water.

Another probable survivor is the horse's dislike to drinking very cold water. It is commonly said that horses like pond water and "dirty" water. What they really like is water with the chill off; cold spring water disagrees with them.

Moreover, they are mighty particular as to the taste of their drinking water. Some years ago one of several horses refused to drink his water, and was at once pronounced to be "ill." This caused inquiry, and it transpired that one of the children had washed a guinea pig in this horse's bucket. The horse would not drink the guinea pig's bath water.

In the same way cows, though less select in their choice of drinking water than desirable for those who consume their milk, dislike touching the water from tubs from which a dog has drunk, and will refuse it altogether if a dog has bathed in it.

The Turks always allow their horses to drink as much as they please, and when they please; and the Osmanli were always accustomed to make long journeys on horseback. But the more intelligent Arabs, than whom no race except the English has paid more attention to the subject, give their horses little water—a practice they follow themselves. A paste of flour, dates, a little water and camel's milk are, among many tribes, the staple food for the desert horse. But we may say of him and his master, "The wilderness and the barren land are his dwelling; he scorneth the multitude of the city." He is a born "abstainer," even from excess in water drinking.—*Farmer and Stock Breeder*.

A GOOD HOUSEHOLD REMEDY.

Mrs. R. LITTLE, of Fernvale, has kindly sent us a household remedy for chapped hands and feet, burns, sores, &c. We do not make a practice of publishing recipes, because there are so many excellent ones suitable for various troubles to be found in the agricultural newspapers that we should but be carrying coals to Newcastle by reproducing them. As the winter season now upon us promises to be a cold one, however, we give Mrs. Little's recipe in the hope that it may prove of value to our readers:—

"Into a clean, enamelled saucepan put 2 lb. of very good lard (fresh preferred), and take two handfuls of green, freshly-gotten Eucalyptus (gum or ironbark) leaves. Place the pan on a slow fire, and, as the lard melts, keep stirring at intervals till all the oil is out of the leaves. Then cool for ten minutes, strain and put away in covered jars for future use.

"This salve is recommended after an experience of thirteen years in the colony. It is a very cleanly, healthy salve for children's sores, and the fly will not trouble them after two or three applications. Even a handful of Eucalyptus leaves in a tub of hot water has been proved to be very soothing to tired or

swollen feet, and takes the swelling out of them by morning. Often poor people, who can ill afford the expense, purchase ointment at 1s. 9d. for a $\frac{1}{2}$ -oz. pot, whilst for 1d. they could make as good a one themselves, if they would only take a little trouble."

It is surprising how few people living all their lives in the bush are acquainted with the great curative properties of the Eucalyptus family. The Blue Gum (*E. globulus*) has banished fever from the Campagna, near Rome, in Italy. Very little fever is ever experienced where the Stringy Bark is much in evidence. For coughs and colds and bronchial affections generally, Eucalyptus extract is a good remedy. Bush people are too apt to believe in wonderful quack medicines which do them no earthly good, unless by the exercise of marvellous faith, whilst they have at hand a remedy for many of the small troubles of life. We would advise mothers to try Mrs. Little's recipe during the present winter.

HORSE-BREEDING IN GERMANY.

THE steady progress of the breeding of horses in the whole of Germany is chiefly due to the interest which the Government takes in it, and which has led it to establish studs, or, more correctly, dépôts of stallions in all parts of the country. These studs, which are entirely maintained by the Government, contain very high-class stallions, the fees for the services of which are only nominal, amounting to from ten to twenty marks (a mark very nearly represents the value of one shilling). The object of the Government in providing these stallions at so low a fee is to encourage the breeding of horses suitable for military purposes; at the same time the breeding of good harness horses is also benefited in a large degree.

HORSE-BOXES.

THE boxes in which horses are conveyed are constructed, as it were, for the purpose of holding infection. The padding is immovable, so that it is absolutely impossible to properly disinfect after a glandered horse has been in one. The mucus from an influenza nose dries on the fittings without losing any of its infective properties. The inmate is tied in such a manner that no one can aid him if he gets down on the journey; the groom in the *coupé* may see a horse strangled and be unable to release him. Everything about a horse-box should be made to work softly, and with the minimum of noise; but what do we find? Does not every part come undone with a jerk, and shut to again with a fearful bang? Then, as to the side which lets down for the incoming tenant—does it not make a noise like thunder when the novice puts his foot on it? All this might be altered by very easy means. The hinged fittings might be so in reality, instead of in name only; and the padding might be composed of hay or straw in movable bags of waterproof material, capable of being washed out with a disinfectant in a few moments, whilst other improvements are obvious.

WELLINGTON POINT SHOW.

THE show of the Agricultural, Horticultural, and Industrial Association of Wellington Point, to take place on 6th August, promises to be of great interest to all classes of the rural and suburban population of the Southern districts; more especially will it prove so to horticulturists, orchardists, farmers, gardeners, and poultrymen.

In looking over the very excellent and liberal prize schedule just issued by the association, we observe that in addition to the ordinary prizes for live stock, general produce, implements, flowers, &c., special prizes are offered for the

best milking cow ; for the cow showing the highest percentage of butter-fat according to the Babcock tester ; for the best bacon pigs, farmers' pigs, and Berkshire boar. Further special prizes are offered for the best kept and cultivated garden, orchard, orangery, or vineyard ; and also for the best farmstead, to include homestead, dairy, and outbuildings, fencing, cultivation, crops, garden, orchard, stock, poultry, and implements. In both cases the prize is the society's gold medal, and in the former also one year's *Australian Tropiculturist*. We especially commend this departure on the part of the society to our farming friends. We had the honour on one occasion to win the bronze medal of the Queensland National Association for the best cottage garden, and we well remember the anxiety with which we awaited the decision of the visiting judges after weeks of earnest patient labour, rewarded by a favourable decision.

The entries closed on 16th July, thus giving fairly sufficient time to intending competitors to get rid of weeds and everything unsightly, and to bring the garden up to a fair standard for a prize which should be looked upon by all cultivators as worthy of special efforts to carry off.

AGRICULTURAL AND HORTICULTURAL SHOWS.

THE Editor will be glad if the secretaries of Agricultural and other Societies will, as early as possible after the fixture of their respective shows, notify him of the date, and also of any change in date which may have been decided on.

LIST OF AGRICULTURAL, HORTICULTURAL, AND PASTORAL SOCIETIES AND ASSOCIATIONS IN QUEENSLAND.

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Allora ...	Central Downs Agricultural and Horticultural Association	J. H. Buxton... ..	
Beaudesert ...	Logan and Albert Pastoral and Agricultural Society	M. Hinchcliffe ...	6 May
Beenleigh ...	Agricultural and Pastoral Society of Southern Queensland	Wilson Holliday ...	30 Sept.
Birthamba ...	South Kolan Agricultural and General Progress Association	G. W. Nixon ...	
Blackall ...	Barcoo Pastoral Society	F. Clewett ...	
Boonah ...	Fassifern and Dugandan Agricultural and Pastoral Association	J. A. McBean ...	28 April
Bowen ...	Bowen Farmers' Club	J. B. Thuman ...	
Bowen ...	Pastoral, Agricultural, and Mining Society ...	J. E. Smith ...	8 June
Bowen ...	Preston Farmers' Association	R. A. Foulger ...	
Bowen ...	Proserpine Farmers' and Settlers' Association	G. W. Pott ...	
Brisbane ...	Horticultural Society of Queensland ..	G. K. Seabrook ...	21 and 22 April and 10 Oct.
Brisbane ...	Moreton Agricultural, Horticultural, and Industrial Association	J. Duffield ...	
Brisbane ...	Queensland Acclimatisation Society	E. Grimley ...	
Brisbane ...	Queensland Fruit and Economic Plant Growers' Association	G. K. Seabrook ...	
Brisbane ...	National Agricultural and Industrial Association of Queensland	H. C. Wood ...	10, 11, and 12 Aug.
Brisbane ...	Queensland Stockbreeders' and Graziers' Association	F. A. Blackman ...	
Brisbane ...	United Pastoralists' Association	Fredk. Ranson ..	
Bundaberg ...	Bundaberg Agricultural and Pastoral Society	A. McIntosh ...	
Bundaberg ...	Bundaberg Horticultural Association	H. E. Ashley... ..	
Bundaberg ...	Woongarra Canegrowers' and Farmers' Association	H. Cattermull ...	
Burpengary...	Burpengary Farmers' Association	C. H. Ham ...	
Caboolture ...	Caboolture Farmers' Association	G. Mallet ...	
Cairns ...	Barron Valley Farmers' and Progress Association	W. F. Logan... ..	
Cairns ...	Cairns Agricultural, Pastoral, and Mining Association	A. J. Draper ...	
Cairns ...	Hambledon Planters' Association	E. Whitehouse ...	
Charleville ..	Central Warrego Pastoral and Agricultural Association	A. J. Carter ...	25 and 26 May
Charters Towers	Towers Pastoral, Agricultural, and Mining Association	W. Tilley ...	
Childers ...	Isis Agricultural Association	H. Epps ...	
Childers ...	Childers Progress Branch, Isis Agricultural Association	N. Rosenlund ...	
Childers ...	Doolbi Mill Branch, Isis Agricultural Association	W. T. H. Job ...	
Childers ...	Childers Mill Branch, Isis Agricultural Association	H. Epps ...	
Clermont ...	Peak Downs Pastoral, Horticultural, and Agricultural Society	F. Leysley ...	
Clermont ...	Peak Downs Dairymen and Settlers' Association	A. G. Pursell ...	
Cooktown ...	Cook District Pastoral and Agricultural Society	W. R. Humphreys ...	
Cordalba ...	Cordalba Farmers' Association	B. Goodliffe ...	
Currajong ...	Currajong Farmers' Progress Association ...	Wm. Howard ...	
Cunnamulla ...	South Warrego Pastoral Association	J. Winward ...	
Gayndah ...	Gayndah Agricultural and Horticultural Association	J. C. Kerr ...	
Gin Gin ...	Pastoral and Agricultural Society of Gin Gin	E. K. Wollen ...	
Gladstone ...	Gladstone Pastoral and Agricultural Association	W. J. Manning ...	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Gooburrum, Bundaberg	Gooburrum Farmers' and Canegrowers' Association	W. J. Tutin ...	14 and 15 Sept.
Goondiwindi	MacIntyre River Pastoral and Agricultural Society	A. Gough ...	
Gympie ...	Agricultural, Mining, and Pastoral Society	F. Vaughan ...	
Gympie ...	Gympie Horticultural Society ...	W. G. Ambrose ...	
Helidon ...	Helidon Scrub Farmers' Progress Association	M. Morgan ...	11 and 12 April
Herbert River	Halifax Planters' Club ...	H. G. Faithful ...	
Herbert River	Macnade Farmers' Association...	E. C. Biggs ...	
Herbert River	Ripple Creek Farmers' Association ...	J. W. Grimes ...	
Herberton ...	Mining, Pastoral, and Agricultural Association	John M. Hollway ...	
Hughenden...	Hughenden Pastoral and Agricultural Association	W. H. Mulligan ...	10 and 11 May
Ingham ...	Herbert River Farmers' Association ...	P. S. Cochrane ...	3 Sept.
Ingham ...	Herbert River Pastoral and Agricultural Association		
Ipswich ...	Ipswich and West Moreton Agricultural and Horticultural Society	P. W. Cameron ...	1 and 2 June
Ipswich ...	Queensland Pastoral and Agricultural Society	Elias Harding ...	
Kalkie ... (Bundaberg)	Woongarra Canegrowers' and Farmers' Association	O. H. A. Kraak ...	
Kandanga	Kandanga Farmers' Association ...	N. Rasmussen ...	
(near Gympie)			
Kolan ...	Kolan Canegrowers' and Farmers' Association	C. Marks ...	
Laidley ...	Lockyer Agricultural and Industrial Society	John Fielding ...	27 and 28 July
Loganholme...	Logan Farming and Industrial Association ...	F. W. Peek ...	12 April
Longreach ...	Longreach Pastoral and Agricultural Society	J. P. Peterson ...	
Lucinda Point	Victoria Farmers' Association ...	W. S. C. Warren ...	
Mackay ..	Agricultural, Pastoral, and Mining Association	F. Black ...	27, 28, and 29 July
Mackay ...	Pioneer River Farmers' Association ...	E. Swayne ...	
Maryborough	Maryborough Horticultural Society ...	H. A. Jones ...	
Maryborough	Wide Bay and Burnett Pastoral and Agricultural Society	G. Willey ...	
Milbong ...	Milbong Farmers' Association ...	T. R. Garrick ...	
Mitchell ...	Mitchell and Maranoa Pastoral, Agricultural, and Vinegrowers' Association	H. J. Corbett ...	
Mosman River	Mosman River Farmers' Association ...	R. Thomas ...	
Mount Mee...	Mount Mee Farmers' Association ...		
Mount Morgan	Mount Morgan Mining, Agricultural, Poultry, Pastoral, and Horticultural Society	G. Orford ...	
Mulgrave ...	Mulgrave River Farmers' Association ...	Thos. Swan ...	
Nerang ...	South Queensland and Border Pastoral and Agricultural Society	W. J. Browne ...	
North Isis ...	North Isis Canegrowers' Association ...	W. J. Young ...	
Pialba ...	Pialba Farmers' Association ...	J. B. Stephens ...	
Pinbarren ...	Pinbarren Agricultural and Progress Association	H. Armitage, senr. ...	
Rockhampton	Central Queensland Farmers' and Selectors' Association	T. Whitely, Coowonga	10 and 11 May
Rockhampton	Central Queensland Pastoral Employers' Association	G. Mackay ...	
Rockhampton	Central Queensland Stockowners' Association	R. R. Dawbarn ...	
Rockhampton	Rockhampton Agricultural Society ...	R. R. Dawbarn ...	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Roma ...	Western Queensland Pastoral and Agricultural Association	H. K. Alford ...	10 and 11 May
Roma ...	Yingerbay Farmers' Association	F. E. Glazier... ..	
Rosewood ..	Farmers' Club	P. H. Adams... ..	25 Aug.
Springsure ...	Queensland Pastoral Society	G. R. Milliken	
Stanthorpe ...	Border Agricultural, Pastoral, and Mining Society	Geo. Simcocks	
Stanthorpe ...	Stanthorpe Horticultural and Viticultural Society	R. Hoggan	
St. George ...	Balonne Pastoral and Agricultural Association	T. M. Cummings	
Toowoomba	Darling Downs Horticultural Association	H. Hopkins	
Toowoomba	Drayton and Toowoomba Agricultural and Horticultural Society	H. Symes	
Toowoomba	Royal Agricultural Society of Queensland	F. Burt	2, 3, and 4 Aug.
Townsville ...	Townsville Pastoral, Agricultural, and Industrial Association (formerly North Queensland Pastoral and Agricultural Association)	J. N. Parkes	
Wallumbilla	Wallumbilla Farmers' Association	P. W. Howse	
Warwick ...	Eastern Downs Horticultural and Agricultural Association	J. Selke	
Wellington Point	Wellington Point Agricultural, Horticultural, and Industrial Association	J. B. Blaine	6 Aug.
Woombye ...	Woombye Fruitgrowers' Association	P. S. Hungerford	
Woowoonga	Degilbo Progress Association	F. A. Griffiths	
Woowoonga	Woowoonga Scrub Farmers' Association	H. B. Griffiths	

Orchard Notes for August.

By A. H. BENSON.

THE planting of deciduous trees should be completed by the end of this month in all parts of the colony, but evergreen trees can be transplanted during seasonable moist weather at any time of the year if the operation is carefully carried out. When set out, the young trees must be cut hard back to a height that in no case should exceed 2 feet from the ground, and in warm dry districts half of this height is to be preferred. Cutting back at planting insures a strong and vigorous young growth, whereas by neglecting to cut hard back at planting the future growth, vigour, and symmetry of the tree are greatly impaired if not completely spoilt. The pruning of all deciduous trees must also have been completed; and all citrus fruit trees from which the fruits have or should have been gathered should be gone over carefully, all dead and badly diseased wood should be removed, and any crossing or superfluous branches, or water sprouts, should be cut away. When the trees are badly attacked by scale this pruning should be severe, in order that the remedies used for dealing with these pests may have a fair chance, as when the top of a citrus tree is allowed to grow like a mat it is impossible to get the spraying material used on to the parts where it is most wanted. Spraying should be systematically carried out in every orchard in the colony during this and the preceding month, and in the case of fungus diseases on deciduous trees during the following month as well. Spraying is just as essential an operation as the gathering of the fruit; and no fruit-grower who wishes to make fruit-growing a success can afford to neglect it, as it is impossible to breed disease in fruit trees and to grow fruit profitably at one and the same time. A full description of the operation of spraying and of the most approved remedies was published some months ago in pamphlet form by the Department of Agriculture, so that any grower who has not received a copy and who desires to obtain the necessary information may obtain it by writing to the Department. After pruning and spraying, the orchard should be ploughed; so that all weeds and trash can be buried, and also that the land that has been trodden down firm shall be broken up. Use a short American plough that will take a wide furrow and turn it right over. The depth at which to plough will depend on the treatment the orchard has previously received and on the nature of the soil. If the soil is shallow, or if the land has never been worked, then the ploughing must be shallow or the roots will be badly injured; but where there is plenty of soil and a perfect sub-drainage, then the ploughing can be from 4 to 6 inches in depth (provided the land has been previously cultivated) without any injury to the trees. In fact, in such soil surface roots are not required, and the trees stand dry weather best when deeply rooted. Grape vines attacked with black spot, where they have not been dressed with sulphate of iron previously, should be treated during the earlier part of the month; and this treatment should be followed in the earlier parts of the colony with a spray of Bordeaux mixture towards the end of the month or just before the buds burst into leaf.

Quick-acting artificial manures, such as sulphate of ammonia, sulphate of potash, or superphosphate, can be applied during the month, but care should be taken not to apply too large a quantity at once, as owing to their extreme solubility a considerable portion of them is apt to be washed out and lost by heavy rains. In conclusion, one more word about spraying, and that is: Do your utmost to stamp out diseases in new districts as soon as ever they make

their appearance. Do not consider any disease too trivial, and that it can be well let alone to a more convenient time, as the more convenient time will not come; but the disease will flourish and spread rapidly, so that what might have been checked, if not eradicated, by half-an-hour's work will now take the grower all he knows to get the better of it. In spraying, whether for insects or fungi, a knowledge of the pests to be treated, combined with carefulness and promptitude, are the essentials of success.

In notes of this kind it is impossible that they apply equally to every part of the colony, but they will be found to be about an average. Very early districts will sometimes require the notes of a month later, and very late districts those of a month earlier; but this will right itself when a year's notes have been written.

Farm and Garden Notes for August.

Farm.—Activity in the field during this and the following month will be richly repaid at harvest time. Potatoes, yams, arrowroot, ginger, and sugar-cane may now be planted. Maize, for an early crop, should be sown as well as pumpkins. Maize-growers would do well to read the article published in the issue of this *Journal* for August, 1897, on the comparative results of deep and shallow cultivation of this crop. Sow lucerne, clover, and Swede turnips. Weeds will shortly begin to assert themselves, and all growing crops should be kept clean.

Kitchen Garden.—This will require to be well attended to, and all plants affected with aphid destroyed. Plant out asparagus, rhubarb, and Jerusalem artichokes in well-prepared beds. A large variety of vegetables may now be sown—such as cabbage, beet-root, lettuce, radish, parsnip, spinach, rhubarb, sea-kale, and asparagus—in properly prepared beds. In warm sheltered situations, towards the end of the month, sowings may be made of melons, cucumbers, tomatoes, and vegetable marrow. Tobacco may be sown during August.

Flower Garden.—All such work as trimming and repairing lawns, the digging of beds, pruning, and planting should be completed. Plant out antirrhinums, pansies, hollyhocks, verbenas, petunias, &c., which were lately sown. Sow zinnias, amaranthus, balsam, chrysanthemum tricolor, marigold, cosmos, coxcombs, phloxes, sweet peas, lupins, &c. Plant gladiolus, tube-roses, amaryllis, paneratum, ismene, erinums, belladonna, lily, and other bulbs. Dahlias would, however, be more advantaged by placing them in some warm, moist spot, when they would start gently and be ready for planting out a month or two later.

Cultural Notes for Tropical Queensland.

[The Cultural Notes for Tropical Queensland, kindly supplied by Mr. E. Cowley, Kamerunga State Nursery, are given a month in advance, for the obvious reason that the *Journal* cannot reach some parts of the far North until the month of issue is well-nigh over, and hence the monthly notes would be valueless until the following year.]

SEPTEMBER.

FELLING scrub should be continued for extending plantation areas. This being generally a dry month, but little planting of any kind can be done. All potatoes should be unearthed. Divi-divi pods still continue to be available for collecting. Oranges display blossom. Coffee-trees are in bloom for the second time. Every effort should be made to eradicate couch-grass from the cultivation. First picking of Liberian coffee commences. Bulbs of *Fourcroya gigantea* now available. Sugar-cane crushing continues. Old canes should be ploughed out, and lands prepared for replanting.

Publication Received.

WE have received a copy of the eleventh edition of the "Handbook of Information," issued by the Australasian United Steam Navigation Company. The work is well got up, and as usual the contents are varied, interesting, and useful. Especially is this so in the initiatory article, entitled "Five Thousand Miles on the Australian Coast." This gives in clear and concise form a mass of information which could only be laboriously learned otherwise from Blue-books, statistics, histories, and geographies, and is most interesting reading.

Neither are New Caledonia, Fiji, or New Guinea forgotten. The illustrations of cities, public buildings, harbours, natives, &c., are all works of art, and give an excellent idea of the various cities on the Australian coast. For the benefit of those who desire information on other points, several pages are devoted to tables of distances (always of interest to the traveller), timetables, passage rates, &c. Taken as a whole, there can be no better guide to the coast of Australia than the handsome publication before us.

Agriculture.

THE GERMAN FARMER.

CO-OPERATIVE FARMING IN GERMANY.

A CONSULAR Report on this subject has just been issued (says *The Standard*) by the Foreign Office, bringing into strong relief the causes which have enabled German so much more successfully than British agriculture to fight against depression. Some of those burdens which press so heavily on our home industry are unknown in Germany, while at the same time her farmers have enjoyed the benefit of protection, which, however mischievous in its general effects, undoubtedly answers its purpose in the case of those for whom it is primarily intended. The report has been received from Mr. T. R. Mulvany, our Consul at Düsseldorf, and is drawn up by a German expert, Mr. F. Koenig, who is said to be specially well qualified for the purpose. They agree in attributing the most salutary effects to fair freights and moderate protection. But Mr. Koenig brings together a great mass of evidence to show that other causes have contributed very largely to the same result, though he does not go so far as to say that these alone, without the other two, would have enabled the German farmer to prosper as he does.

State aid in Germany has been carried out on a scale wholly unknown in this country. The State has founded Agricultural Colleges at many of the old universities—at Berlin, Göttingen, Leipsic, Halle, Munich, and Bonn among others; and where there are no colleges there is a Chair of Agriculture, with professors to lecture on the subject. Thus an amount of scientific knowledge has been disseminated among the German farmers which has qualified them to cope “with the dishonesty of dealers in cake, meal, seed, and mineral manures; has taught them how to feed their stock so as to produce either meat, milk, or muscle; and what quantities of nitrogen, phosphates, and potash a crop needs, and which must be replaced.” Our German expert assumes that the British farmer is deficient in this kind of knowledge. If so, it is a pity, since he can buy all mineral manures, cakes, and meal much more cheaply than his Continental rivals. While plenty of scientific agricultural knowledge exists in England, we fear that it is not diffused, but sticks fast somewhere among the capitalists. It is not, however, only the Agricultural Colleges at the universities to which our attention is directed. By means of schools established all over Germany, and maintained or subsidised by the State, agricultural science is brought home to the peasant farmer. In Wurtemberg there is a special school for the training of farmers’ sons. There are dairy and farriery schools. “One of the greatest of German institutions is the State experimental stations, established for the purpose of making experiments of all kinds, and for testing fodder, manure, seeds, &c., for farmers, at quite a nominal fee.” There are some private establishments of the same kind, but the greater part are subsidised by the State.

Even local Chambers of Agriculture receive State assistance, and travelling agricultural lecturers are also supported by Government. But the report attributes even more to the principle of co-operation than to State education. “Co-operation is the German farmer’s stronghold and bulwark, and he means to stand by it.” It is of various kinds. There are co-operative credit banks, the working of which is fully explained in the report, co-operative dairies, co-operative steam ploughs, and co-operative drainage and irrigation. “Co-operation,” says Mr. Koenig again, “has proved to be the key to success in Germany, and has saved many thousands of farmers from ruin.”

The banks conducted on this principle enable farmers to obtain loans on personal security only, the collective guarantee of all the members or depositors being considered sufficient. "Wealthy banking firms and rich capitalists were all willing enough to lend money on real estate if sufficient security was forthcoming; but personal credit is what German farmers wanted. It is indispensable to buy stock, mineral manures, cake, meal, seeds, tools, machinery, and to pay wages—in short, to run the business. All the union requires is the co-operative guarantee of the members of the co-operative society, a body of men of recognised standing." As all the members are personally acquainted with one another, the risk is next to nothing. That the system is a sound one seems to be proved by the results of the audit. In February, 1897, the auditors reported that of 649 banks in Wurtemberg, 450 were thoroughly satisfactory, 192 were satisfactory with room for improvement, and only seven were unsound. In Germany, the Government, by having the management of the railways in their hands, are able to arrange an equitable system of freightage, while, thanks to the co-operative principle, the farmer "can avail himself of the lowest freights on all the materials he requires, and on all products sent to market, by loading in quantities of at least one ton." Under this system preferential rates are in Germany "an immense advantage to the farmer, whereas in England they are dead against him, the advantages there being reaped by his foreign competitor." Mr. Koenig is surprised that this state of things should continue to exist in England, and also that English farmers do not form co-operative banks.

How much longer this ancient industry will retain its position, even in Germany, seems a little uncertain. It is already beginning to yield to time and fate and the competition of the New World. A large proportion of the soil is in the hands of peasant proprietors; some of it is let as in England, and a considerable extent, the property of the nobility, is farmed by the owners. The proprietor cultivates his estate with the labour of the peasantry, who are practically *ascripti glebæ*, receiving only a small modicum of wages in cash and the rest in kind, being boarded and lodged at the landlord's expense. It seems to us that if the proprietors in Great Britain chose to do the same thing, and to work as hard as the Germans, they might not only improve their financial position but regain much of their former influence. In Germany, though the fall in rents would indicate a decline in the returns from agriculture, this class of proprietors make their own rents, and "appear to thrive." They live the life of an English country gentleman. They shoot partridges, roe deer, and hares, and the sugar beet crops afford such excellent cover that the birds will lie till they are trodden on. But the exodus of the farm labourers has commenced in Germany, where more profitable industries are beginning to draw them from their native fields. The supply of labour is growing daily more scanty. Men are imported from Russia and Poland; and the increase in the number of women and old men employed in field labour shows that the pick of the peasantry are turning their thoughts elsewhere. It is important to observe that this tendency on the part of the rural population to gravitate towards the towns is not in Germany, at all events, owing to any difficulty experienced by the agricultural labourers in obtaining land. "The farmers are only too ready to let small holdings at a nominal rent, or to sell out a few acres to their men to induce them to remain in the country." But even this temptation fails to retain them. In Bavaria rather a curious custom prevails with regard to small holdings. "Land is not subdivided among the children of the family. As a rule, one of the children inherits the whole farm at a fair price during the life of the parents, when the latter reach their 'sixties.' The remaining children get 'paid out,' but retain the right of living in the house if ill-luck meet them in life." Elsewhere, to prevent the evils of subdivision, the State has intervened, every parish being now empowered to take measures for reclaiming very small patches and bringing them back into one plot. "Every workman," says Mr. Koenig, "has the option of acquiring land and building his own cottage, and this very fact forms, socially and politically, the mainstay of the country." Yet, as we see, it will not keep the peasantry in the land.

Turning to live stock, we find that sheep farming in most parts of Germany is on the decline, owing to the fall in the value of wool. Cattle are kept chiefly with a view to milk and draught purposes. But in Westphalia, Mecklenberg, and Saxony sugar beet roots, in the language of the report, seem to be "the order of the day." The difficulty with this crop is the number of labourers which it requires and the increasing scarcity of skilled hands, owing to the higher wages to be obtained in towns. Agricultural wages vary, of course, in different districts. The ordinary labourer earns 1s. 9d. a day in summer, 2s. a day in harvest, and 1s. 6d. a day the rest of the year. But then he gets a cottage free, a small plot of ground for potatoes, and another for linseed; and he has the use of the farm horses to work his allotment. Piecework is paid much higher; and in Saxony it seems that this system is the commoner of the two. Beer is one of the staple products of Bavaria, where great attention is naturally paid to the barley crop. It has been found that by careful selection of varieties, &c., the quality of malting barley can be greatly improved. The brewer then pays a higher price for it, and the farmer makes a profit where formerly there was a loss. Bavarian beer may only be brewed from malt and hops, and this regulation is enforced by very heavy penalties. Here, at all events, is something which is made in Germany which Englishmen may well covet. We have no space for all that the report says of the reclamation of moorland and its beneficial results, which the writer thinks might be reproduced in Ireland. Nor can we more than mention generally what he says about the excellence of German agricultural implements. These "are as good as those of any country, with the exception of mowing machines and binders, in which the United States are first, and of steam ploughs and threshing machines, in which England excels." It seems, on the whole, to be the writer's opinion that if British farmers had the scientific knowledge of German ones they would be able to hold up against taxes and railway rates, open ports and foreign competition. "We must never forget that medical science at one time was revolutionised by chemical analyses and physiological studies, whereas in olden days medicine was practised much as a matter of routine, simply by experience. It is an incontestable fact that the chemical laboratories of the Agricultural Colleges have revolutionised agriculture. . . . Nowadays we know the chemistry of the soil, the plants, the live stock, the manures, the foods. Thus agriculture to-day is as much a science as in olden times it was a matter of purely practical experience." The report concludes as follows:—

The best foundation a State can give to its people is a thorough genuine and technical education, to fit them out adequately in order to be able to successfully fight their way; it affords them the best chance of being able to work against long odds, so that they may hold their own in bad times, and even through a crisis. The German farmer has had to fight against agricultural depression, but, by means of his thorough education and resources, backed up by science and State help, he has withstood bad seasons and low prices; he has been going ahead all the time, learning how to increase his crops and increase his income per acre in the same proportion as prices receded; with this object in view, no stone was left unturned, and his resources were strained to the utmost. He found great help in co-operation, as I have tried to show: co-operation in credit, loans, purchase and sale of produce, purchase of foods, seed, mineral manures, in drainage and irrigation works of large dimensions, and in dairying. In all his struggles the State helped him, by encouraging scientific research at its experiment stations by gratis advice, and farmers recognised the value of unions and combined efforts to fight and swim up stream. He recognised that, single-handed, he was powerless to achieve anything, but, although not individually intrinsically wealthier when combined, he found himself, when united, and working hand in hand co-operatively, strong enough and able to withstand worse times than before.

In this country State aid has a bad name; and, though all classes are ready enough to take it when they can get it, most of them denounce it when offered to any but themselves. The prejudice, however, has its good side; and if the land were treated fairly in other respects, we doubt if English farmers would either require or desire such fostering care as is bestowed on their

calling elsewhere. If a great industry like agriculture cannot rest upon its own bottom, there must be something wrong in the conditions under which it is pursued. Nor are we at all satisfied that the present report makes out a case for German agriculture which political economy could approve.

CASTOR OIL MANUFACTURE.

THERE is so little difficulty in the manufacture of castor oil that it seems wonderful that the industry has not been commenced in Queensland on a commercial scale. One variety of the plant grows most luxuriantly all over the eastern coast lands, and if cultivated, the best variety only being selected, the returns should give some profit on the necessary preliminary outlay. We gather the following simple method of preparing the oil from the *Western Australian Producers' Guide and Settlers' Record* :—

Up to the present, nothing has been done locally in the way of extracting oil from the castor-oil plant. Briefly, the operations of oil extraction are by expression, by boiling with water, or by the agency of alcohol. A comparatively simple process can be tried by anyone interested, and a good oil should result if the seed is of the right variety.

The seeds are first cleansed from dust and fragments of the capsules; and submitted to a gentle heat, not greater than can be borne by the hand, which is intended to make the oil more fluid and more easily expressed. A whitish oily fluid is thus obtained, which is boiled with a large quantity of water, and all impurities are skimmed off as they rise to the surface; the water dissolves the mucilage and starch and the albumen is coagulated by the heat, thus forming a layer between the oil and the water; the clear oil is then removed and boiled with a small quantity of water until aqueous vapour ceases to rise, and a small quantity taken out in a phial remains perfectly transparent and cool. The effect of this is to clarify the oil and rid it of volatile acid matter. Care is necessary not to carry the heat too far, as the oil would acquire a brownish colour and an acid taste. In India the seed is first shelled and then crushed between rollers, placed in hempen cloths, and pressed. The oil is afterwards heated with water in a tin boiler until the water boils. This serves to separate the mucilage and albumen, the product being then strained through flannel and put into canisters. Any oil-press would suffice for extracting oil for ordinary purposes, and by decantation and some process of filtration it could be purified.

The use of castor oil as a lubricant for the cylinders of locomotives and other steam-driven engines ensures a market for the product if the quality is equal to the imported article. For use medicinally the oil is cold drawn, and is only fitted for a medicine in that form.

The plant itself is easily cultivated, it requires little care, is hardy, and is said to enhance the value of the land on which it has been grown. It is said that locusts are killed by eating the leaves, and this is quoted as a reason for planting the shrub around paddocks and cultivated land in districts infested by locusts. Cattle should be kept from the plant, as in times of scarcity the green leaves might prove tempting to them, and the effect would probably be that the animals would be seriously affected, if not actually killed. Judging by the reported luxuriance with which the plant grows in the Esperance district, the extraction of the oil should be a profitable industry.

ACTION OF FRESH WATER ON SOILS.

SOME soils are so saturated with soluble salts that no crop plant will grow upon them. This fact is well exemplified along the whole coast of Queensland on low-lying flats, and on very low, once swampy islands. Such land at present would not be looked at by the farmer, and indeed the man who set

nimself the task of clearing and trying to cultivate these lands would be simply throwing his money away, but in years to come these lands, or those nearest to the centres of population, will surely be reclaimed, and then it is that science will step in and show how it is to be done. Now what is the action of fresh water on vegetation? When felled trees are subjected to the action of water for any lengthened period, the soluble substances in their tissue are washed out, and the timber undergoes a change which results in most cases in its final destruction by decomposition. In the same manner, when a soil is exposed to constant saturation, or rather washing, with fresh water, that soil undergoes a chemical change. The soluble salts which militate against successful cultivation are washed away. The land becomes sweet, and, by working, is aerated. Agricultural operations may henceforth be carried on on such land under certain conditions of drainage, fertilising, &c.

To give an instance of this: In 1801, at the siege of Alexandria, the British cut the narrow neck of land which kept out the sea water and submerged the estate of Dranet Pacha at Kap-ed-Dawar, and in the basin of Lake Aboukir, which was at one time one of the most fertile spots in Egypt, though lying below sea-level. The soil of these areas became charged with soluble salts to such an extent that no crop plant will grow upon it. These salts can only be removed in solution by washing. Such work has been successfully carried out on the land in question, which is being gradually but surely restored to its pristine fertility. Surface washing is found to be of no practical benefit. There is only one way of accomplishing the object in view—that is, by passing successive washings of fresh water through the body of the soil. The land to be treated is laid out in rectangular areas, 300 by 50 metres, containing about $3\frac{1}{2}$ acres each. On three sides, ditches 3 feet deep and 4 feet wide at the surface are dug, and retaining banks, to hold the water on the land to be treated, are constructed, 3 feet to 4 feet wide and 6 inches to 10 inches high, of the earth excavated from the ditches. Water is brought in at the higher end of the area, and as each charge soaks through and escapes by the drains, a new supply is run on—the operation being actively continued from September to May inclusive—one man, with wages of £1 per month, having in charge about 75 acres. In April the seeds of “dineba,” a native grass which thrives, like rice, in 6 inches of water, are sown, and if the reclamation be complete, clover may succeed it in the rotation. After a good crop of clover, cotton will grow, and the work may then be regarded as satisfactory. Heavy land which does not permit the water to pass freely through it may take also a portion of the following season to complete its washing.

The area of Egypt under cultivation is over 6,000,000 acres, and the population numbers fully 9,500,000. It is stated by one authority that the soil of Egypt at one time supported 20,000,000 inhabitants, but at that time the cultivated area was probably much greater. It is believed that a natural dam which has been broken and worn away existed at the First Cataract, and that the decrease of population was concurrent with the diminution of the available water supply and the shrinkage of the area under cultivation.

Dairying.

ADULTERATION OF BUTTER.

A FACT with which Queensland dairymen are probably not acquainted is that shiploads of what is called teal-seed are constantly being imported into Denmark from India. This seed, when pressed, produces a beautiful, tasteless, and inodorous fat, which is largely employed in the adulteration of butter.

TEMPERATURE FOR CHURNING.

RECENT dairying experiments published by the manager of the Government dairy school at Ontario, in Canada, show the advisability of churning sweet cream at a very low temperature (45 degrees or below) in order to obtain all the butter. Churning sweet cream at ordinary temperatures, it is found, means a great loss of fat in the buttermilk. Sweet cream butter is found not to possess such good "keeping quality" as ripened cream butter, as it quickly goes off in flavour and does not improve or take on the flavour of ripened cream butter as claimed by some. The temperature of the cream usually rises 10 degrees in the process of churning, indicating that the low temperature (yet necessary to start in) is not suitable for bringing the butter in order to gather all the particles of fat. The most difficult part of the butter-maker's task found in these experiments, and the one requiring most skill and good judgment, is the proper ripening of the cream. A number of different "starters" were used, and of all the "pure cultures" tried there appeared to be none that produced so marked an effect on the flavour of the cream and butter as Conn's bacillus No. 41. A similar flavour was produced in the cream and butter by using a starter made in the ordinary way—namely, by heating some skim milk to 90 degrees, and allowing it to sour. As a starter for ordinary creamery work he recommends pasteurising the skim milk (heating to 170 degrees for twenty minutes), cooling it to 85 degrees, and then adding about 5 per cent. of good flavoured buttermilk in order to maintain a uniformly good flavoured cream and butter. From day to day he adds from 5 to 10 per cent. of this starter to the cream, and it results in a more even flavoured butter during the year.

CANADIAN BUTTER AND BACON.

THE Commissioner of Agriculture and Dairying at Ottawa, Canada (Mr. Jas. W. Robertson), writes to the *Times* :—

In reports which have appeared in the Press regarding the agitation in the county of Glamorganshire against the use of preservatives in butter, allusions have been made implying that some preservative, made up chiefly of boric acid or boracic acid, is used in colonial butter.

Whatever may be the case in regard to butters from Australasia, which are generally known in the market as colonial butters, the only preserving substance used in butter made in Canada is pure salt. Borax, boric acid, boracic acid, and such preserving substances, are not used by Canadian dairy-men or shippers.

Borax and similar substances are not used in the curing of bacon and hams in Canada. A slight dusting of borax is put on the outside of the pieces when they are packed in boxes, to prevent them from having an undesirable appearance when the boxes are opened. That dusting of borax is removed from the sides and hams when they are unpacked.

Canadian food stuffs are pure and wholesome, and have all the excellence and superior nourishing properties that belong to products from farms in a cool climate managed by a highly civilised people, who are particularly clean in their methods of work.

TUBERCULOSIS IN CATTLE.

FOR several weeks past breeders and others interested in the raising of live stock have been looking forward anxiously to the result of the tuberculin test, as applied to a stud bull imported from England by Mr. John Lee, of Bathurst. The animal, which was purchased at an extravagant price, was a beautiful specimen of the original Shorthorn type, being perfect in symmetry and colour. He was landed here and placed in quarantine, according to the

regulations, on 10th January. The authorities, deputed by the Board of Health, discovered symptoms of tuberculosis, but the animal, being a valuable one, it was decided to apply the tuberculin test. Up to this time it was a matter of doubt among breeders as to whether the test was a deciding point, but this case settled the matter, as developments set in rapidly, and the bull, yielding to the test, was destroyed at once, in the presence of the Stock Board, in charge of Mr. J. W. Chanter, inspector of stock for the metropolitan districts. The locality of the disease was in the left jaw, and the tubercle taken away weighed $2\frac{1}{8}$ lb. The loss is a serious one, not only from a financial point of view, but from the fact that Mr. Lee has, for the past twenty years, been endeavouring to introduce this strain into his herd, and, as this class of cattle is becoming more and more extinct, the loss is the more to be deplored.—*Exchange*.

TUBERCULOUS COWS.

UNDER the sensational heading, "Cow Carnage at the Abattoirs," *Truth* (N.S.W.) reports a wholesale slaughter of diseased milch cows from a Botany dairy. The journal in question says:—

Of the various Government Departments, the Board of Health is about the most difficult to get into action. Its machinery moves cumbrously like a huge 100-ton gun; but once a shot strikes the object of its destiny, destruction is terrific. Such was the case lately, when eight fine-looking well-conditioned milch cows from a well-known North Botany Dairy were slaughtered at the abattoirs by the authority of the Board of Health, and found, as anticipated, to be badly diseased with tuberculosis. The tubercles were found in different parts of the animals in various stages of development. The symptoms of disease in the herd in question were first noticed in one of the cows by the Botany residents, who communicated with the inspector for the North Botany Council. That officer satisfied himself that the animal was badly diseased, and informed the Board of Health. He received instructions to immediately destroy the cow and search for tuberculosis. Accordingly the beast was killed and dissected, and tuberculosis was found to have developed into its worst degrees; the cow having a very large tubercle in the neck, the lump being conspicuous through the distension of the skin. Mr. Edward Stanley, Chief Veterinary Surgeon to the Government, subsequently visited the dairy and inspected the fifteen remaining milch cows. His experience satisfied him that the disease must have spread to some of the other beasts, and he determined on injecting tuberculin into all the cows to test their condition. The temperature of each beast was taken before the injection, and in a specified time it was again taken. Eight of the cows showed a very high temperature after the elapse of some hours, and the test having proved the presence of tuberculosis they were confiscated and taken over to the abattoirs for slaughter. Mr. Stanley ordered the cows to be killed. The owner and his specially engaged veterinary surgeons were present, together with a few interested spectators and a member of *Truth's* staff, who had been specially deputed, at the request of the owner, to witness the slaughter and examination and see that he got fair play. Mr. Shelly, the chief inspector at the abattoirs, was present with Mr. Stanley. The first three cows killed looked good milkers and exhibited no outward sign of disease, but, when the heads were cut off, one beast showed the tubercles freely in the neck. Another was clean in the neck, but the liver and lungs were diseased. The third showed the tubercles in different places, one being in the flesh above the loins close to the spine on the back.

THE SECOND TRIO.

Three more were then killed and examined with equal care. Each of them had the disease in a greater or lesser degree, and the tubercles were also found in the udders. In the case of a nice-looking, fat, little, brown beast,

there was no sign of disease in either neck, lung, or liver, and at first sight she appeared to be healthy. But when Mr. Stanley ordered the intestines to be examined and the hard lumps cut open, she was in even a more advanced stage of tuberculosis than the other five. The result of the examination of this beast was indeed surprising, and no one was more surprised than the owner. He had looked upon the animal as one of the most healthy in his dairy.

THE THIRD BATCH.

The remaining two belonging to the dairyman were slaughtered in company with a young speyed cow, said to have been sent down to the Homebush Saleyards with a mob from Queensland. The dairyman's cows were examined first, and plainly showed the tubercles on lungs and liver. The Queensland animal was a mass of disease, one tubercle being as big as a sheep's liver. Everyone present was satisfied that the eight milch cows were unfit for dairy purposes, while the speyed beast was altogether unfit for food. Mr. Stanley and Mr. Shelly were thoroughly satisfied with their morning's work, and the owner of the milch cows seemed satisfied that the Board of Health was justified in its action. Although it is a very heavy blow to the dairyman to see nine of his herd destroyed within a week, it is gratifying to the public to know that so many diseased milkers will no longer help in spreading the disease of consumption through the milk-pail. The nine cows were valued at upwards of £50. Before they were killed and examined, the owner had the usual assurance from the Board of Health that, if any or all of them were affected with tuberculosis, he would only receive the value of the hides and fat, less the slaughter-man's charges. This is the practice followed in every case. Dairymen should bear in mind that one badly diseased cow may contaminate the whole herd. The highly contagious tuberculosis is a menace to the milk trade, for once it takes hold it means ruin. A healthy outward appearance is no proof of the absence of the disease, in its early stage, and it should be to the interest of every dairyman to have his herd inspected and tested with the tuberculin. This precaution may prove of very great value in the end. If there are diseased beasts in use they can be destroyed and the healthy beasts secured against infection. It would even be advisable, if not most desirable, that dairymen should have all cows tested with the tuberculin before completing the purchase of them. It is no use trying to deceive the health inspectors if owners are aware of any diseased milkers in their herds. The very closest scrutiny of milkers will henceforth be maintained by the officers of the Board of Health and the suburban council's health inspectors.

DISPOSING OF CARCASSES.

Very great care is taken at the abattoirs that not a particle of the diseased meat gets into consumption. Immediately the inspection is over, and the carcasses are condemned, they are cut up and placed in a cart for conveyance to the boiling-downs. Kerosene is freely poured over them in the vehicle, while the tongue, liver, kidneys, etc., are slashed to pieces by the slaughtermen and rendered unfit for use. Every necessary precaution is taken.

ENSILAGE AND MILK.

An interesting experiment has lately been made at the Queensland Agricultural College by the Principal, Mr. John Mahon, showing the value of green barley as a milk-producer above that of ensilage.

The ensilage-fed milkers went gradually off their milk as the cold weather set in, until only six gallons were obtained from 13 cows. As soon as green barley was fed to them they began rapidly to improve, until within a week the milk yield rose to 26 gallons, and a few days later to 32 gallons.

If ensilage consists of pigeon-pea and maize, and is mixed with maizemeal, and no change of food is given, the cattle will go almost dry, the milk production being almost *nil*. Further experiments will be made with ensilage, and the results will be published in the *Journal*.

It would, however, appear that although the silo is a most valuable adjunct to the farm as a stand-by against bad seasons, yet the dairyman must not expect much in the way of milk production by its use alone. He must provide his milkers with green food of some kind or another in order to keep up the supply.

THE DAIRY FACTORY SYSTEM.

THE year which is passing away is a noteworthy one with the dairy farmer, if only for two causes, says "Merlin" in *The Field*—the tremendous efforts which have been put forth by Canada and the United States for the establishment of a big market for butter in this country, and the marked stride which has been taken in Ireland in connection with Irish creameries, and which, it is to be hoped, will be still greater in the coming year under the beneficent guidance of Mr. Horace Plunkett, M.P., and his friends. I have been reading the account of a Belgian creamery, which is supported by a large number of two and three cow farmers, who are required to find so much capital per cow, but who are permitted to subscribe it through the medium of deductions on the quantity of milk they send. An excellent suggestion lies at the back of this practice. If a man with three cows supplies six gallons of milk per day during a large portion of the year, and is able, as in this country, to allow two-twentieth of 1d. per litre, or very nearly $\frac{1}{4}$ d. per gallon, to remain, it is not long before he becomes a small capitalist. Let us suppose that a twenty-cow farmer, contributing to a co-operative creamery in this country, followed the same plan; assuming that he contributed thirty-six gallons per day, and that from each gallon $\frac{1}{4}$ d. was kept back when his cheque was paid, he would at the end of the year have a nest-egg amounting to about £13 10s. He would scarcely feel the deduction from his weekly cheque, and he would convert his society into a savings bank, which, in course of time, would help him immensely to increase his stock or to extend his holding. When a young man looks forward to what it is possible to save in the course of years, the end is so far distant that he usually declines to commence the burden of saving; but when an older man looks back he only too clearly sees how true it is that a resolution to commence and continue to save is one of the wisest which any man can adopt who is dependent upon his own exertions. In Belgium there are many local societies which possess offshoots in the form of mutual credit societies, cattle insurance societies, fire insurance, cattle breeding societies, and associations for the purchase of the material for the farm. Why should not the farmers, who run every creamery, institute one or more of these very economical organisations, especially those intended to provide them against loss in case of the death of a cow, and to provide the form of credit which is generally understood by the term "land bank" or "credit bank." It is worthy of notice that, in the case of the creamery to which I have referred, the machinery is worked by an electric plant, and that this plant is utilised for the supply of light to the neighbours in the streets, the church, and the station, with the result that the cost of production is diminished by one-half. Here, then, lies a second suggestion. Why should not the power of the creamery be utilised when it is not required, which, in some cases, means eighteen hours out of the twenty-four, as it is in a few cases in Ireland?

Poultry.

CRUSHED BONES IN THE POULTRY YARD.

By "ORMSKIRK."

BREEDERS of poultry of the times neglect to supply one of the most important things in the poultry-yard—namely, raw bones. Persons who enter into poultry-breeding, whether for their own use or for the market, should not neglect to use sufficient raw bone, either crushed or in the form of meal. It contains lime, as do also oyster shells; but it also contains animal matter which is of great value. Bone, when burnt, is of comparatively little use, but when crushed or ground raw supplies value peculiar to itself. All classes of poultry are extremely fond of it. Care should be taken to have it pure and sweet. It is good for all classes and ages of poultry.

For young turkeys it is almost indispensable to prevent leg weakness. At about the time of their "shooting the red," when their health becomes established and they grow apace, the development of their frames and legs requires a more liberal assimilation of material than can be afforded by the usual articles of food. It is well to begin to mix a little bone meal with the feed of small turkeys, and from the time they are four weeks old it can be used freely.

No injurious effects follow, for it is nutritious, and especially it supplies material to rapidly develop and strengthen the bones of the legs. All breeders of turkeys know that leg weakness is one of the evils to which they are exposed, and this is a natural and excellent preventive. And here is one of the many cases where prevention is better than cure. Brahma, Cochin, and other Asiatic chickens for the same reason are greatly benefited by its use.

Raw bone has been proved by analysis to contain every part of an egg—white, yolk, and, of course, shell. It should be constantly kept in a special place, in the pen or apartment of laying hens, as they will consume large quantities of it, and it goes chiefly to egg production. Granulated is the best form in which to place it before adult fowls, and in this shape it keeps fresh longer than when ground into meal. Bone is one of the principal ingredients in the composition of most of the "egg foods" in the market.

The use of special preparations and tonics in the poultry business at the present time is very large indeed. The owner of half a dozen fowls, who keeps them for the use of the house, is one of the largest supporters of these special foods which are placed so continuously before the public. The farmer who adds poultry to his stock for the purpose of adding to his income is also a large purchaser in poultry preparations. There are so many of these preparations now extensively manufactured and sold for poultry food, each brand claiming some special or particular excellence or superiority, that it is almost impossible for a novice to tell which one to take, and even old breeders are at a loss in making a selection. Those breeders who give their birds unlimited range at all times often wonder why condimental foods are so largely bought and so generally fed by poultry-breeders. Yet the answer is simple enough. This demand is explained when we remember that the fowls kept in confinement, either entirely or throughout the full breeding season, are liable and subject to disorders and ailments, while the lack of exercise naturally begets a sluggishness which must in a great measure be overcome by special feeding and by special food. Anyone who is posted on breeding live stock will readily understand this, while those who are not, will, ere long, gain the necessary experience. There is no doubt many a case where the use of condimental food is not only useless, as far as good results are concerned, but soon becomes positively injurious, the same as tonics to a sick person are a great benefit properly taken, while they would prove decidedly injurious to a healthy, vigorous

person. Judgment and common sense must be the guide in this matter as well as in all other departments of successful management, and the exercise of both is assuredly needful when feeding stock with a preparation, the nature or ingredients of which are not fully known, or their action on the system clearly understood. Red or cayenne pepper is used to a considerable extent by farmers and breeders when a mild and healthy tonic is needed. For this purpose it is considered by many most excellent, but, like many other good things of this life, should be used in moderation. A weekly meal of it, with the corn meal or other mixed and moistened food, will do a great deal of good, it is stated, to the birds, both old and young, whether the poultry be on an extended range or confined to restricted quarters. There are some foods which are made and sold to further special purposes, noticeably the "egg foods," some of which are good, and others good for nothing. Any food, however, that serves to keep the fowls healthy and vigorous, no matter whether it is labelled "egg food" or not, will generally influence egg production.

POULTRY FOR PROFIT.

A VICTORIAN dairyman, who combines poultry-raising with the milk business, is very emphatic on the question as to whether poultry will pay. He considers that each hen and pullet is worth 15s. a year for eggs alone. During an interview with a representative of a Victorian journal he stated that a correct account had been kept, and that is what the egg return shows, which means that 180 eggs were laid by each fowl, at an average of 1s. per dozen. As eggs very often sell at 1s. 6d. per dozen, it is safe to allow a credit of 150 eggs to each hen. This may truly be termed an object lesson. As this dairyman must have eggs to supply his customers, it is necessary that a good laying strain of fowl should be kept. He therefore devotes his whole time to Minorcas and Brown Leghorns, and all this he does on a place hardly big enough to "swing a cat," as the saying is, but so arranged that he has the birds under perfect control.

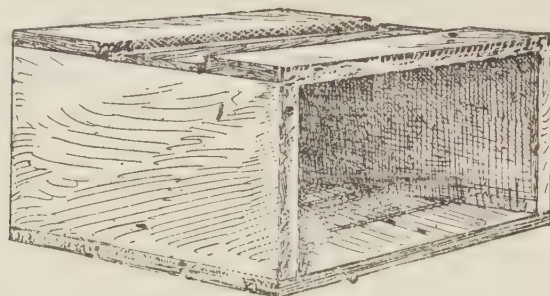
POULTRY FOR EXPORT.

At the Sydney Royal Agricultural Society's recent show a splendid collection of poultry suitable for export was shown by the New South Wales Board of Exports. The collection was described as one of the greatest attractions of the show, and, from an educational point of view, is stated to be one of the greatest object lessons taught farmers. The labels on the various exhibits were somewhat amusing. For instance, one, on a small duck, read—"The too common duck; a specimen bred by farmers, classed as wholly unprofitable." Another duck placed alongside as a contrast was ticketed—"This is the sort to breed; 7 lb. weight, sixteen weeks old; cost to rear, 1s. 5d." Amongst types that farmers are advised to get rid of are:—"A five-year-old hen, long since outlived her usefulness; a mongrel fowl, unprofitable to breed; and a common hen, as specimens of the useless 'barn-door,' which still rules the roost of many a careless farmer." Amongst the useful crosses, the Houdan-Andalusian is described as a good layer of large white eggs, and excellent table qualities; Old English Game-Plymouth Rocks, an excellent cross for excellent meat; Houdan-Orpington, good layers of brown eggs, develop quickly, fine fibre, white flesh, a splendid cross; Game-Wyandotte, develop quickly, of great weight, and plenty of breast meat. The Brown Leghorn has not benefited the table quality of the farmer's fowl. Farmers and others in South Australia will naturally ask, where is the Dorking in all these crosses? for it is well known that the Dorking is almost at the head of the breeds at present in use in South Australia in cross-breeding.—*Adelaide Observer*.

The Orchard.

STANDARD FRUIT CASE.

THE Intercolonial Fruit Conference held in Brisbane during June, 1897, recommended the adoption of a standard fruit case, of which the contents should be 2,438 cubic inches.



The outside dimensions of the case, when made of Tasmanian hardwood, are as follow:—Length, 20 inches; depth, 15 inches; width, 10 inches; the top, bottom, and sides of $\frac{3}{8}$ -inch and the two ends of $\frac{3}{4}$ -inch timber; the two end pieces to be, therefore, $9\frac{1}{4}$ inches by $14\frac{1}{4}$ inches.

Where pine is used, the top, bottom, and sides to be of $\frac{1}{2}$ -inch timber, ends same as hardwood. This makes the case rather larger outside measurement, but the same inside measurement.

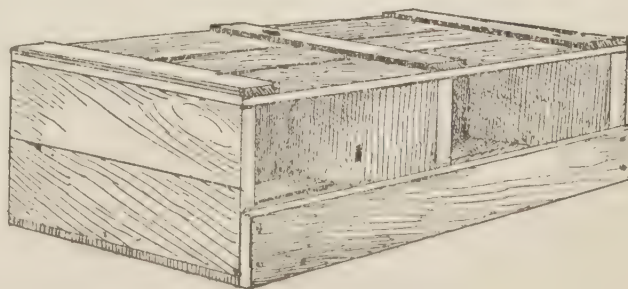
This case has been used by Mr. Warren, of Harcourt, Victoria, for shipping apples to London; and the following extracts taken from a letter written by Mr. Warren to Mr. Benson, together with extract taken from the letter of London agent, should be of interest to Queensland fruit-growers:—

Mr. Warren writes:—"I may state that it cost me 4d. per case less for ship freights in consequence of using the new case; this was a great saving to me on my 600 cases that I shipped home. I am also using the new case for all my shipments to Queensland."

The London agent writes to Mr. Warren as follows:—"The fruit arrived in very good condition. . . . The square cases in which you pack your fruit are the most suitable, and should be general if possible."

The fruit shipped by Mr. Warren to the colony has reached here in very good condition, the cases standing the journey well. The fruit is less bruised than when packed in the commonly used narrow cases. The experience gained thus tends to prove that the standard case is the most suitable case, and should be generally used.

The outside dimensions of the Victorian case are as follows:—Length, 28 inches; depth, $8\frac{1}{2}$ inches; width, $12\frac{1}{2}$ inches.



Viticulture.

VINEYARD NOTES.

By E. H. RAINFORD.

Soon after vines are pruned, the first ploughing should be given to break up the soil and facilitate its aerification; and where vines are trained on wire and cross-ploughing thus impeded, the soil between the vines should be hoed or forked. It is necessary that care be taken that vines are not ploughed at any time to a greater depth than they have been accustomed to, as, closely below that depth, will be found an extensive arrangement of surface roots, and a ploughing deeper than usual will tear these up and seriously injure the plant. The writer saw lately a vineyard where this had happened last season, and the result had been—no crop, and half the spurs of the vines dead. It is advisable to start a moderately deep ploughing with young vines, and to enable this to be done the surface roots should be pruned off in the first two years, after which the vine will be strong enough to stand the laceration by the plough of any new small surface roots that may afterwards form. One of the troubles of the vigneron in the coastal districts is the short time the vine remains dormant; until late in the autumn it continues to vegetate and even to form fresh bunches of grapes, which is very exhausting to its vitality. Much of this is owing to climate, but something is undoubtedly due to the fact that, between the vines trained on wire, the roots are almost at the surface, and in some cases between the rows also, where a superficial scarifying is all the cultivation the vine gets. The result is that, in warm damp weather, the surface roots continue to absorb and circulate sap with consequent activity of vegetation. Were the vines ploughed sufficiently deep from the first, these surface roots would not form, and the vine would be less influenced by vicissitudes of temperature.

In some places the young shoots of the vine are liable to be injured by late frosts. Should this happen, vignerons are strongly advised to prune the affected shoots down to the eye at the base of the first leaf. This should be done if possible within twenty-four hours of the injury, and in nine cases out of ten the result will be healthy, fertile wood for next season's pruning, whereas if the frost-bitten shoot is left to itself it will, if badly injured, die right back, or if only slightly damaged will send out a number of laterals, none of which will make the requisite fertile, healthy wood. Care must be taken to rub off all water shoots which will start from the old wood and the base of the spurs. This procedure has been thoroughly tested in France, and found to be the best in most cases of frost-bite.

Botany.

CONTRIBUTIONS TO THE FLORA OF NEW GUINEA.

Continued from Vol. III., page 162.

By F. MANSON BAILEY, F.L.S.,
Colonial Botanist.

Order LEGUMINOSÆ.

MANILTOA.

M. Schefferi, K. Sch. (*M. grandiflora*, Scheff.) A small tree or wide-spreading tall shrub, the branchlets more or less covered with circular lenticells. Leaves 3-4-jugate, leaflets rigidly coriaceous, about $3\frac{1}{2}$ in. long, 2 in. broad in the centre, somewhat rhomboid, very oblique, the costules near the upper

margin, lateral nerves very oblique and few, transverse reticulate veinlets numerous, apex emarginate. Flowers white in dense axillary, spike-like racemes, at first covered by the oblong bracts which fall as the flowers open. Peduncles very short. Bracts ovate or nearly orbicular, brown, closely imbricate, the upper ones of the raceme whitish, and nearly 1 in. long and 4 lines broad, hairy at the end. Pedicels 1 in. long, white, angular, enlarging under the flower; sepals and petals about $\frac{1}{2}$ -in. long, very delicate and deciduous. Stamens numerous in more than one series, filaments flexuose, bearing (when fresh) white hairs (rusty when dry), about 1 in. long, anthers 2-celled. Style long, flexuose. Ovary ferruginous hairy, very oblique, shortly stipitate.

Hab: Small bay, foot of Mt. Trafalgar. This plant is given under Dr. Schumann's name, for one reason to prevent it being confused with *Cynometra grandiflora*, A. Gray—a plant to which it bears some resemblance, but, as Dr. Schumann says, differs considerably in both leaf and flower.

Order APOCYNACEÆ.

TABERNÆMONTANA, Linn.

T. aurantiaca, Gaudich. (*Rejona aurantiaca*, Gaudich.) The Orange-fruited Taberne. A small tree or large shrub. Leaves 6 to $9\frac{1}{2}$ in. long, $4\frac{1}{4}$ in. broad towards the upper end, oblong, ovate to ovate-lanceolate, often tapering much from above the middle to a petiole of from $\frac{1}{2}$ to 1 in. long, apex obtuse or obtusely-acuminate, pale on the under surface; lateral nerves prominent, curved, almost parallel, 12 or more on each side of the midrib. Flowers white, fragrant, usually in two terminal dichotomous cymes. Peduncles about 2 in. long, the branches bearing 2 or 3 pedicellate flowers at their extremities. Pedicels 7 or 8 lines long. Calyx-tube cylindrical, about 6 lines long, with a dense ring of oblong glands at the base inside; the lobes 5, very short, rounded, and for the most part hyaline. Corolla-lobes obovate-cuneate, 7 or 8 lines long and nearly as broad at the end; the tube within the calyx spirally twisted, swelled, and then constricted at the top. Cone of anthers pointed; hypogynous scales truncate. Fruit indehiscent, very light, nearly globose or oval, the largest seen 3 in. in diameter, some orange, others lemon-coloured, marked on one side by 2 longitudinal ribs. Epicarp membranous, the inner substance surrounding the seeds white and very spongy; seeds rather numerous, cuneate, 6 lines long, 3 lines broad at the wide end, deeply marked with longitudinal wrinkles.

Hab.: The flowering specimens were gathered near the Musa River. The fruit, which in appearance somewhat resembles an orange, was often met with on the Mambare beach washed about by the tides, but here I saw no plants; the fruit had probably been brought down the river by the current. The plant has previously been recorded from New Guinea. The present description is given to enable persons visiting the New Guinea rivers to identify the fruit or plant when met with. From the same locality a small shoot bearing a single fruit of that curious-fruited plant, *Neuburgia musculiformis*, Miq., was gathered by one of the party.

Order PALMÆ.

SUBTRIBE PTYCHOSPERMEÆ.

DRYMOPHLÆUS, Zippel.

D. mambare (n. sp.). Stem rather slender, about 20 ft. high. Leaves pinnate, 5 ft. long, deep-green, glabrous; segments opposite, numerous, folded and attached to the face of the rhachis, often meeting at the centre ridge, about 18 in. long and $1\frac{3}{4}$ in. broad, midrib sharp above the underside bearing curled distant scales, the apex obliquely truncate, more or less torn, each margin elongating into a jagged point, but not the midrib. Panicle below the leaves; peduncle short, flattish, the branches or spikes whitish, rather thick. Flowers usually in threes, the centre one developing later than

the side ones, those on the panicle examined only in the early-bud stage, but probably female. The lateral or male flowers—bracts imbricate, orbicular, scarcely 1 line in diameter. Sepals rather longer with somewhat longish hairs on the margins. Petals valvate, twice as long as the sepals. Stamens numerous, over 36 in the flowers examined, surrounding what appeared to be a sterile ovary or style. Fruit only one obtained, purple, exocarp juicy; endocarp 5-sulcate or 5-ribbed, about $\frac{1}{2}$ -in. long. Albumen not deeply ruminant.

Hab. : Swamp off Mambare beach, New Guinea, May, 1898. In some respects this palm somewhat approaches *Ptychosperma angustifolia*, Blume, Rumphia II. 122.

SUBTRIBE CARYOTIDEÆ.

ARENGA, Labill.

A. gracilicaulis (n. sp.) Stem slender, arising from the centre of numerous radical leaves, seldom exceeding 10 ft. Radical leaves—petiole $3\frac{1}{2}$ ft., mealy-scabrous, sheath clasping the stem below and produced above the petiole into a ligula about 1 ft. long. Rhachis about 4 or 5 ft. long, bearing on either side about 25 alternate segments, besides the several confluent ones which form the terminal fan, and the lowest which are in clusters of four; those at the centre of the leaf about $1\frac{1}{2}$ ft. long, and from $\frac{1}{2}$ to 1 in. broad, linear, mealy on the underside, midrib prominent, contracted at the base almost into a petiolule, attached to the sides of the rhachis, the apex a broad blunt or sharply-toothed point, the terminal ones nearly truncate. Inflorescence at first terminal, afterwards from the axils of the leaves down the stem, probably diœcious; sheathing bracts numerous, narrow, lanceolate, 1 ft. or more long, quite enclosing the peduncle. Panicle (male) short, the branches or spikes of flowers about 1 ft. long. Bracts 3, orbicular. Calyx very short, the segments forming a 3-lobed cup. Petals valvate, 3, hard, horny, ovate, 3 lines long. Stamens numerous, having a curious appearance from many hanging down from between the petals; filaments much shorter than the anthers. Spikes of female peduncle often exceeding 3 ft. long. Stigmas on the young fruits 3-lobed, quite sessile. Ripe fruit said to be red, globose, and 1 in. in diameter, but none ripe at the time of our visit (24th May, 1898).

Hab. : At the top of a small bay, foot of Mount Trafalgar. The horsehair-like fibre produced at the upper part of the leaf-sheath by species of this genus, is in the present one straight and slender, and might probably be found useful in the manufacture of brushware.

CONTRIBUTIONS TO THE FLORA OF QUEENSLAND.

By F. MANSON BAILEY, F.L.S.,
Colonial Botanist.

Order MUSCI.

LEUCOBRYUM, Hampe.

L. strictifolium, Broth. in Öfver. Finska Vet. Soc. Förh. Bd. LV. Diœcious; slender, cæspitose, tufts somewhat loose, depressed, broadly spreading, glaucous-green, stems elongated, creeping and rooting throughout their whole length, foliage dense, arranged in five rows, somewhat densely branched, branches short; leaves dense, acute, cuspidate, sub-erect, straight, oblong-lanceolate, the upper ones with large teeth on the back, mucronate, margins erect, conniving in the upper part, bordered, border hyaline, formed by 5-6 series of cells, produced continuously to the apex; laminæ composed of two strata of equal cells; perichæatial bracts acuminate, arising from a narrow

vaginate base, broadly limbate, minutely serrulate; seta lateral 1.5 cm. high, somewhat flexuose, slender, purple; theca nodding, suboval, asymmetrical, scurfy, when dry plicate; operculum lengthily subulate from the conical base.

Hab. : Eumundi, *J. H. Simmonds* and *Bailey*.

CALYMPERES, Swartz.

C. (Hyophilina) panduræfolium, *Broth. l.c.* Dioecious; caespitose, the tufts soft, broadly spreading, dwarf, somewhat loose, green, scarcely 1 cm. high, erect, straight, densely rooting below, simple or subsimple; leaves when dry imbricate, margins involute, apex incurved, when damp erecto-patent, somewhat flat, panduriform, obtuse or shortly contracted at the apex, as much as 1.9 mm. long and 0.57-0.66 mm. broad, margins erect, quite entire, nerves thick; base .075 mm. broad, green; evanescent near the apex or below the summit of the apex; scabrous in the upper portion of the under surface; cells pellucid, subrotund, .01-.012 mm., papillose; transverse epidermal outline obovate, composed of rectangular large hyaline empty cells, the basal and lateral ones much smaller and chlorophyllose.

Hab. : Cape York, *W. Micholitz*.

LEPTOHYMENIUM.

L. papuanum, *Broth. l.c.* Dioecious; slender, caespitose, tufts loose, intricate, depressed, yellowish-green, somewhat glossy; stem elongated, creeping, emitting brown rootlets throughout its whole length, flexuous, branching in an irregular pinnate manner, branches short, when dry like catkins, curvate, straight when wet, densely leaved, obtuse; leaves when dry imbricate, erecto-patent when wet, somewhat concave, from the base broadly ovate, by degrees narrow-acuminate; the margins on the lowest base smoothly revolute, quite entire, or very minutely crenulate, with two short yellowish nerves; cells narrow elliptic, papillose, wings numerous, oblate, chlorophyllose, those on the branches smaller, less acuminate.

Hab. : Thursday Island, *W. Micholitz*.

Order FUNGI.

CLAVARIA, Vaill.

C. Baileyi, *Massee* (n. sp.) Pallid, or with an ochraceous tinge, 3-4 cm. high, stem rather stout, up to 1 cm. long, slightly downy at the base; branches mostly originating from one point, numerous, fastigate, each dividing into several branchlets the tips of which are simple or bifurcate, glabrous. Spores white, elliptical, minutely warted, 5-6 x 3 μ . (*Ex* letter from Royal Gardens, Kew, England.)

Hab. : Brisbane, on the ground.

PHYLLACHORA, Fckl.

P. graminis, *Pers.* (Cooke, in *Handb. Austr. Fungi*, 296.) Stroma distinct or confluent, innate in the parenchyma of the leaf, rather prominent, covered by the adnate, shining, blackened epidermis, variable in form, for the most part oblong or lanceolate, black, unequal, rugulose (about 1 m.m. long); perithecia immersed, ostiola latent. Asci cylindrical, 78-80 x 7-8 μ . Sporidia ovoid, simple, usually including a large guttule, hyaline, 8-12 x 4-5 μ . Spermatia falcate, 16 x 1½-2 μ , hyaline in the young cells.—*Cooke l.c.*

Hab. : On kangaroo-grass leaves, growing on damp land at Toowong.

USTILAGO, Pers.

U. leucoderma, Berk. (Cooke's Handb. Austr. Fungi, 325.) Sori black, seated on large spots, somewhat covered with an unequal, whitish crust; spores rounded, rather irregular, 13-17 μ diameter, opaque, black, even. Recorded several years ago in my Catalogue of Queensland Plants without description.

Hab.: Formerly Bundaberg, *J. Keys*. The present habitat, Gatton, *E. M. Shelton*. In the axils of the inflorescence of a form of the Common Nut-grass (*Cyperus rotundus*, Linn.)

PUCCINIA, Pers.

P. caricis, Reb. (Sacc. Syll. Fung. VII. 626.) Spermogonia arranged in small or large heaps, honey-coloured, sporules ellipsoid, 4-5 x 2 μ , yellowish; æcidia disposed in single or double series on yellowish, reddish or reddish-purple spots on the underside of the leaves and on the stems; pseudo-peridia cup-shaped, flattened, broad, margins white, lacero-denticulate; æcidiospores polygonal, minutely warted, 16-26 x 12-20 μ , orange. Uredospores in orbicular or ellipsoid or oblong sori. Sori girdled with fissure of the epidermis, brown, shortly pedicellate; paraphyses none; teleutospores in elongate sori, either under the leaves or on the stems, erumpent, girded by fissures of the bark, black-brown or nigricant, crowded, clavate-oblong, the apex thickly incrassate, obtuse or rounded or explanate, middle region constricted, the base a narrow pedicel, 30-45, rarely 70 x 42-20 μ , smooth, brown, pedicel, 20 x 6-12 μ , rigid florescent persistent.—*Sacc. l.c.* (Determined for me at Royal Gardens, Kew, England.)

Hab.: Gatton, *E. M. Shelton*. On the leaves of a variety of the Common Nut-grass (*Cyperus rotundus*). Parasitic on the above fungus was *Darlucella filum*, Cast.

In Dr. M. C. Cooke's Handbook of Australian Fungi the above plant is noticed as under:—*Æcidium urticæ*, Schum. Spermogonia disposed in small or large heaps, honey-colour, sporules ellipsoid, 4½ x 2 μ ; æcidia disposed in a single or double series on yellowish or reddish spots, on leaves or stems; pseudo-peridia cup-shaped, flattened, with a whitish margin, which is toothed and reflexed; æcidiospores polygonal, minutely warted, 16-26 x 12-20 μ , orange.

Hab.: On nettles, &c., Bacchus Marsh.

PHYLLOSTICTA, Pers.

P. flavidula, Sacc. Syll. Fung. III. 24. Spots various, girt when dry by a very pale-reddish border; perithecia few, covered, lentiform, 100 μ in diameter, pierced; sporules ovoid, 2½-3 x 1, of yellowish transparency, the heaps honey-coloured.—*Sacc. l.c.* (Determined for me at Royal Gardens, Kew, England.)

Hab.: On leaves of *Callistemon lanceolatus*, Endeavour River, *Miss Lovell*. First found on leaves of a plant of the same genus in a French garden.—*Sacc. l.c.*

GLEOSPORIUM, Mont.

G. carpophilum, *Massee* (n. sp.) Pustules erumpent, irregular in form, usually elongated, often anastomosing, ½-1½ mm. long, amber colour. Conidia hyaline, continuous, cylindrical, ends obtuse, 15-18 x 3-4 μ . Conidio-phores cylindrical, shorter than the conidia. (*Ex* letter from Royal Gardens, Kew, England.)

Hab.: Mourilyan Harbour, on fruit of *Xanthophyllum Macintyrii*. W. Mugford.

Economic Botany.

No. 8.

LIGNUM VITÆ (*GUAIACUM OFFICINALE*, Linn.)

By J. F. BAILEY.

Derivation.—Guaiacum, from Guayacan or Gayco, the native name.

Description.—A small tree belonging to the natural order Zygophyllæ (Bean-caper family), with numerous, spreading, jointed, knotty branches; bark smooth, ash-grey; young shoots somewhat flattened, several from a node. Leaves numerous, evergreen, crowded, opposite, with stipules about 3 inches long, which fall off very early; leaflets in two or three pairs, unequal, the terminal pair being the largest, all broadly oval or obovate, very blunt at apex, rounded at the base, often unequal-sided; rather thick, bright-green, veins rather prominent above, invisible beneath. Flowers light-blue, rather large, on slender straight stalks about an inch long, in clusters of four to ten. Fruit about $\frac{3}{4}$ -inch long, smooth, brownish-yellow, two-celled (*vide* plate, which is taken from Bentley and Trimen's Medicinal Plants). Native of the West Indian islands, especially Jamaica, Hayti, and Cuba; it is also found in Colombia and Venezuela, on the South American continent.

Uses.—Guaiacum wood, which is remarkable for the singular brownish green of the heart, is chiefly used on account of its extreme hardness, toughness, density, and durability. It also possesses stimulant, diaphoretic, and alterative properties, but its action is not so strong as the resin.

In a country like Queensland it might seem superfluous to recommend the cultivation for profit of any plant for the sake of its wood when we take into consideration the vast number of our indigenous kinds, over 600 of which are on view in the Museum attached to this Department; yet among the thousand woods of the colony there is none, so far as at present known, that could take the place of Lignum Vitæ, which is so well adapted and in great demand for the making of pestles, mortars, blocks, pulleys, rulers, skittle-balls, &c., and also used extensively in engineering work. The retail price in Brisbane of the wood is 1s. 3d. per lb. Some of our indigenous woods of small growth, such, for instance, as *Hovea longipes*, sometimes called "Port Curtis Yellow-wood," might be experimented with as a substitute for Lignum Vitæ. (For a description of the tree and an account of the wood, see No. 115A in Bailey's Catalogue of Queensland Woods.)

The resin, called "gum guaiacum," is either a natural exudation or is obtained by jagging or notching the stem, and allowing the exuding juice to harden; or logs of the wood, after having been much incised in their middle, are suspended horizontally in the air by two upright stakes, and then set on fire at their two ends; the melted resin then runs out from the centre in large quantity into some vessel put to receive it. Good guaiacum resin fetches about 2s. per lb. in the London market. It is commonly impure, owing to the careless manner in which it is collected. It possesses stimulant, diaphoretic, and alterative properties. It is a useful remedy in chronic forms of rheumatism, more especially in that variety which is relieved by warmth; also in syphilitic and gouty affections, scrofula, skin diseases, and various uterine affections. The common tincture of guaiacum has been employed diluted with water to cleanse the mouth, strengthen the gums, and to relieve toothache. It is brittle, breaking with a clear glassy fracture. It is readily powdered, and

Plate XLVI.

LIGNUM VITÆ (*Guaiacum officinale*).

when fresh the powder has a greyish colour, but by exposure to air and light it becomes green. It has little odour, except when powdered, in which case it is somewhat balsamic, and when exposed to a temperature of 185 degrees it melts and emits an odour somewhat resembling benzoin. Its taste is but slight at first, though when chewed it leaves a burning sensation in the throat. It is readily soluble in alcohol, ether, chloroform, and solutions of the caustic alkalies. An alcoholic solution produces a clear blue colour when applied to the inner surface of a paring of raw potato. Another excellent test of guaiacum is nitric acid; thus if paper which has been wetted with tincture of guaiacum be exposed to the fumes of nitric acid, it speedily becomes blue.

An allied species, *G. sanctum*, Linn., a tree much resembling *G. officinale*, is the source of the Lignum Vitæ, exported from the Bahamas, as well as some of that shipped from Hayti. (B. and T. Med. Pl.; Lind. Fl. Med.; Kew Guide, &c.)

Apiculture.

NOTES FOR BEE-KEEPERS.

[By BEE-MASTER in the *Farmer and Stock Breeder*.]

DRONES AND THEIR SUPPRESSION.

THE "G.O.M." of American bee-keeping stated, when referring to the inordinate quantity of drones found in many apiaries, that if six combs of hatching drone brood be put into a fairly strong colony at the commencement of the honey-flow, the drones would consume all the honey gathered by the workers of that colony and none would be stored as surplus. "It is natural," some say, "that drones should be produced." Quite so, but an unusually strong lot of drones in any particular hive may cause the loss of the stock, and their very existence is supposed to be that they may take their part in the increase of bee-life and not in its destruction by a mere accident, for such a large array of drones very frequently is the result of what may fairly be termed an accident, just as we refer to events being caused by the accident of birth.

AT THE WILL OF THE QUEEN.

To make the whole matter understood, let me say that the queen, so long as there are empty cells for both worker and drone, exercises her own will as to whether the eggs she lays should produce a worker (neuter) or a drone (male). The eggs to produce workers, which are really undeveloped females or queens, are exactly similar in every respect. Before leaving the egg-duct they receive a minute portion of fertilising fluid, of which the queen has a certain quantity, which cannot be added to; and, therefore, the more eggs the queen lays to produce workers, the shorter becomes her period of usefulness. When, therefore, after depositing worker eggs for the early weeks in the new year, she finds vacant drone cells, she economises this valuable fluid, and places in the drone cells unfertilised eggs that in due course produce drones, or male bees, that are incapable, by their very construction, to take part in any domestic duty whatever. It is often said that drones are very valuable in a bee-hive because they create heat. They certainly do that, but at the expense of honey, which would be more economically used if consumed by worker bees; they not only helped to keep up a normal temperature, but took their turns in the many duties which must be carried on by the "workers" of a bee-hive,

THE ABNORMAL PRODUCTION OF DRONES

takes place in hives that have been started without due thought as to the kind of comb the bees of the swarm will build. If we put a good swarm into an empty skep or movable comb hive, the frames of which contain starters of foundation only, just at the commencement of the honey-flow the bees desirous of storing all the honey they can gather will build those cells that are quickest and most economically built, hence a superabundance of drone cells. The same swarm, particularly if headed with a young queen, hived at another time when the inflow of honey is only moderate, will build almost exclusively cells of worker size only.

Worker cells might be produced in the brood-chamber, even though the swarm is hived during the honey-flow if a super be given at once, for then the surplus honey will be taken above, while the combs below will be composed of worker cells in which breeding is carried on.

CHECKING THE INCREASE OF THE DRONES.

In movable comb hives it will soon be necessary to make arrangements for checking the increase of drones, but, as it can only be done by removing drone and substituting worker comb, frames filled with foundation must be ready and given when the stocks are becoming strong, and such a frame at the side of the brood-nest is not likely to be a detriment. When it is found that the bees take to and work into combs readily frames of foundation, it is only a matter of a few weeks to convert all the combs into nice, straight combs of worker cells.

It must be stated, however, that it is a very dangerous practice to give the full sheets of foundation in the centre of the brood-combs at the commencement of the season. They should always be given at the side, and if well wired into the frames that method of giving new frames is preferable at all times.

For some weeks, however, food and wraps with narrow entrances are the essentials to steady progress of breeding arrangements within the hive.

QUEENSLAND HONEY IN LONDON.

Our apiculturists appear destined to continual bad markets for their honey in England. Complaints are made by the home experts of every shipment sent from Queensland. The latest are laid against the honey exported by the "Jumna" and "Duke or Argyll." It is stated that the shipment by the former vessel (seventy cases) was unfit for table use, although admirably adapted for manufacturing purposes. It was not very clear, neither was it of good flavour. This refers to twenty cases from Brisbane. With regard to fifty cases sent from Rockhampton, the experts report that the honey was of fair quality and in good condition, but it possessed a somewhat peculiar flavour, and was not a table honey. It was too dark and too varied in colour—two very serious drawbacks for a table article. It was much inferior to Jamaican honey. It was sweet and strong enough for manufacturing purposes; and as there was always a fair demand for this class of honey, there was no reason why Queenslanders should not continue to send it. But no hope of better prices could be held out. If any price from 20s. to 22s. 6d. would satisfy the Queenslanders, then he might send forward, for that was about all Queensland honey was worth in the present state of the market.

Thirty of the "Jumna's" cases had been sold at these figures. Jamaican honey, which was clear and firm and of a quickly "setting" character, sold at from 26s. to 30s. per cwt.; but Queensland honey such as the Rockhampton shipment would never fetch this price in England. The qualities it should possess are—lighter colour, more pronounced flavour, and with a greater aptitude for "setting." It is recommended that honey be sent to England in casks of from 3 cwt. to 4 cwt.

Clover pasturage is recommended for flavouring the honey.

We have in the Museum of the Queensland Department of Agriculture several samples of Queensland and Jamaican honeys. These samples do not at all bear out the statements of the English experts. Two bottles of Queensland honey are very light in colour and show good setting properties, whilst a sample of the Jamaican product is very dark, darker even than golden syrup. We cannot understand why it is that the home buyers so persistently run down Queensland honey—why they talk so much of the Eucalyptus flavour, or why they harp upon its dark colour as contrasted with other colonial honeys, when optical evidence shows that our honey is many degrees lighter in colour than the Jamaican. As to the old cry of Eucalyptus flavour, honey produced on the vast plains of the Darling Downs, and in other plain districts utterly devoid of Eucalyptus or of any other timber, cannot possibly be so flavoured. With regard to clover, we presume that the Red Clover is meant. Red Clover is not grown in Queensland, except in perhaps a garden plot. The humble bee which is requisite for its fertilisation is not yet introduced here, and we question very much if it would be of any advantage to grow the plant extensively, seeing that lucerne and other fodder plants supply all requirements in that direction. During the honey-gathering season we have the maize flower, which attracts millions of bees. We have seen also Teosinte flowers borne down by the weight of the bees on them, and these certainly cannot produce any Eucalyptus taint in the honey derived from them. When our products come to be placed properly before the English buyer, without the intervention of the middleman, Queensland honey may be appreciated at its true value.

Horticulture.

NOTES ON SCENT-YIELDING PLANTS.

By NAT SINE.

No. 2.

LEMON (*Citrus lemonum*).—This well-known essential oil is obtained from the rind of the lemon either by distillation or expression. That which is produced by the latter method has a much finer and more lemony odour than the distilled product.

This essence is largely produced in Sicily, where the lemon, orange, and bergamot are extensively cultivated; suitable land for lemon cultivation often reaching the extraordinary price of £100 per acre.

In Sicily the lemon is grafted on the bitter orange, as, if grown from the seed, the fruit is liable to be affected by the disease known as "gumming."

At one time old trees used to produce from 3,000 to 5,000, but nowadays only average 1,000 lemons each, the falling off being due to neglect in the matter of cultivation. Lemon-growers would find it profitable to put all refuse fruit through a still for the oil, for which there is a great demand in European markets.

This last season, many lemons grown in Southern Queensland were unfit for market on account of the fruit being "gummy." It is highly probable that the growers never troubled to extract the oil from the rind of this fruit.

In Sicily it costs 1s. 4d. to extract the essence or oil from the rind of 1,000 lemons, which return from 12 oz. to 16 oz. of oil, worth at the least 10s. per lb. This oil should be preserved in well-closed vessels, and kept from light and heat, as it has a tendency to oxidise rapidly and lose its fine odour. A very fine oil is also distilled from the leaves of the lemon-tree.

MARJORAM (*Origanum Majorana*).—The oil obtained by distillation of the leaves and stems of the common garden marjoram is exceedingly powerful, and is much used for scenting soaps.

Plants may be raised from cuttings planted, say, in April, if the weather be mild; but a better plan is to divide old plants into as many single-stemmed plants with a root or two as possible. These should be planted in well-worked ground at distances of from 18 to 20 inches each way. A couple of chippings with hand cultivator or hoe will be all that is necessary to keep down weeds, as the plants will soon completely cover the ground. If for purposes of distillation, reap the whole plant just before flowering; but if for sale as dried herb, two or three cuttings may be obtained in the year.

One hundredweight of dried herb will yield about 1 lb. of oil, valued at about 16s. in the European markets.

Marjoram likes a deep, friable, loamy soil and a temperate climate; under which conditions the plant will grow to about 18 inches in height.

MINT (*Mentha viridis*).—The oil of spearmint is very powerful, and is much used for scenting soaps in combination with other perfumes.

This plant yields on distillation from 4 to 5 lb. of oil per ton of green plant, valued at about 70s. per lb. It is generally propagated from rooted plants taken from old beds, and is very hardy and easy to grow. If planted about 15 to 18 inches each way, the plants will soon cover the surface, and keep down most weeds. It does not necessarily need a damp soil, as it grows very well on deep, loamy, well-drained land, and will give about three cuttings in the year. There is a good market for the dried stripped leaves; the retail price of the imported article being about 6d. per quarter-pint bottle, which generally contains a very fair proportion of foreign material.

Care should be taken in planting mint, as it may become a regular pest, and in some soils it is very hard to get rid of.

ORANGE (*Citrus aurantium* and *bigaradia*).—Very fine perfumes are obtained from the flowers, fruit, and leaves of both the bitter and sweet orange. During the season at Nice, in the south of France, there are sold daily from 15 to 18 tons of orange flowers. A ton of flowers will yield on distillation about 40 oz. of oil, worth about £22, and the highly scented distilled water is worth another £10. The perfume distilled from the flowers is used largely in the manufacture of eau de Cologne and other scents. That obtained from the leaves, twigs, and unripe fruit is mainly used for scenting soaps, and is worth about 50s. per lb. The perfume obtained from the flowers by maceration in melted fat is quite different from that obtained by distillation, and exactly reproduces the scent of the fresh flower. It requires 8 lb. of flowers to perfume 1 lb. of fat, divided over thirty-two infusions. This perfumed fat is worth about 8s. per lb. The rind of the ripe fruit yields on distillation an oil worth from 12s. to 16s. per lb. Each full-grown tree yields about 25 lb. weight of flowers annually. If, after extracting the oil from the rind, the fruit be cut up, mixed with bran, and fed to cows, it causes them to yield very fine milk. The finest perfume obtained from the rind of ripe citrus fruits is procured by squeezing the peel in one hand against a sponge held in the other. When the sponge is saturated, the oil is squeezed from it into a bottle and finally filtered to remove impurities.

ORRIS (*Iris florentina*).—From the dried root of the orris or iris is obtained a very pleasant odour somewhat resembling that of violets.

The orris is extensively cultivated at Pontassieve, in Foscana. The root is harvested every three years, the plants being dug up just before they start the next year's growth; the flag is then cut back to about 8 inches above the ground line, and the root a little below that mark. This part is planted

again, as only the roots are required for commercial purposes. In two or three years the new plant will have made numerous roots and offshoots. The orris does best in a poor soil, and requires no manure. When gathered, the roots are spread out to dry and ripen in the field, and are then trimmed into shape, at the same time being sorted into various qualities. Sometimes the roots are bleached with fumes of burning sulphur, and find a ready sale for the turning of beads. Orris is chiefly used in the form of powder for various purposes in perfumery, but an otto may be obtained from it by distillation; it is, however, very expensive and not much used, as, in a concrete state, it reaches the extravagant price of £40 per lb. Orris is likely to find suitable soil and climate in Southern Queensland, as some of the Iris tribe seem to do well about Brisbane.

PATCHOULI.—This plant, although a native of South-eastern Asia, seems to have a wide range of climate, as it can be successfully grown in the vicinity of Brisbane. As it cannot stand frost, it is hardly likely to be profitably grown south of, say, Bundaberg; but is worth a trial, as it produces on distillation a powerful smelling oil of a dark-brown colour, worth about 36s. per lb.

One hundredweight of herb will yield about 2 lb. of oil, which is the densest perfume known, and occupies the lowest note in the scale of odours.

The dried leaves are also a marketable commodity, and find a ready sale in the London market.

Patchouli is cultivated to some extent in Singapore, where the whole plant is reaped within a few inches of the ground, one stem being left to keep the root alive. About six months after reaping, the plants will yield a second cutting, having in that time attained a height of about 2 feet. A third cutting may also be obtained, after which the old plants are dug up and new ones grown from cuttings.

The plant strikes readily from cuttings, which, from the writer's experience, are better if taken from fairly matured wood than from young shoots.

Cuttings may be struck at any time between March and September, those planted before the winter being transplanted, if necessary, in the spring. If planted about 2 feet apart, and 4 feet from row to row, it would admit of horse cultivation, as the plant is of upright growth.

PEPPERMINT (*Mentha piperita*).—This plant is successfully cultivated in many countries, as, for instance, Japan, America, and England, and has found suitable soil and climate even in Victoria.

It is a very hardy plant, and although preferring a temperate climate will stand a good deal of heat, provided the season be a moist one. Except under very favourable conditions, it cannot withstand drought for any length of time.

In cool localities it does not necessarily need a moist situation, provided the soil be of a deep porous nature, such as the red volcanic scrub soils of our coastal ranges. In the early stages of its growth peppermint is very like the common spearmint, and strangers on first seeing a patch of it have been known to remark, "By Jove! Mint sauce." It has actually been used for that purpose by the unskilled domestic to the disgust of the partakers of the accompanying roast lamb.

In England there are cultivated two kinds of peppermint, known to commerce as "white" and "black," from each of which a fine oil is produced, although that extracted from the former is the more valuable to the extent of about 10s. per lb. The "black" mint, however, has the advantage of being the hardier and standing cold, heat, and drought better than its ally. It also produces from one-fifth to one-fourth more oil per acre than the white mint under similar conditions.

From the writer's experience, peppermint grows from 2 to 3 feet in height, and if well-manured will give heavy crops. Calculating proportionally from a small patch, a return at the rate of 9 tons to the acre has been obtained at one cutting, supplemented by an aftermath at the rate of 2 tons per acre, making in all a return at the rate of 11 tons per acre from first year's plants. The season, however, was exceptionally favourable, and the ground well manured. Strange to say, the second cutting smelt very much stronger of peppermint than the first, and when handling the dried herb the menthol fumes were unpleasantly strong to the eyes.

Peppermint may be planted in the spring in the same manner as ordinary mint, about 15 to 18 inches each way; a piece of runner about 4 inches long, if placed diagonally in the ground, will soon take root and spread over the surface, strangling the very hardiest of weeds, which seem to have no show amongst peppermint. One planting will generally last five years. After cutting, the field should be either covered with about 2 inches of soil or ploughed in.

The oil is extracted in the ordinary manner of distillation by direct contact with fire. Most essential oils are extracted by means of steam heat, but it is said that peppermint needs the direct action of fire to extract some of the properties of the plant. The process is very simple, much more so than jam-making.

The writer has seen very good peppermint oil produced with no better means than a kerosene lamp, an old brass hot-water kettle, a couple of feet of glass tubing, a sponge, and cold water; condensation being effected by occasionally squeezing cold water from the sponge on to the glass tube.

In England 1 cwt. of peppermint is said to yield from 12 to 16 oz. of oil, valued at about £2 per lb. Victorian figures differ somewhat from these, as growers there state that an acre yields from 3 to 5 tons of green herb, giving from 5 to 7 lb. of oil per ton, valued in London at about 25s. per lb. A well-known Brisbane chemist distilled 5 lb. of dried herb for the writer last year, and obtained a return of $\frac{1}{2}$ -oz. of very good oil.

Quoting from an American paper:—"Some 150,000 lb. of peppermint oil are produced annually in Michigan alone from about 15,000 acres of land. It takes about 350 lb. of dried herb to produce 1 lb. of oil, an acre of land yielding from 6 to 10 lb. of oil, and in exceptional cases even as great a quantity as 50 lb. The plant is cut when in blossom, like hay, and when dried is placed in wooden vats and steamed until the oil passes over with the vapour through the worm or condenser into the receiver, where it separates from the water and is drawn off."

It has been found by experiment that dried peppermint herb affords by distillation over a naked fire, a greater quantity of oil than by steam distillation; the oil obtained by the latter method being specifically lighter and of a brighter colour than that obtained by the former.

Fresh herb yields equal quantities of oil by both methods. The dried herb contains two different oils having different boiling points and specific gravities.

That well-known chemical, menthol, is a stearoptene obtained from the oil of *Mentha piperita* and other allied varieties of peppermint.

Of all scent-yielding plants, peppermint is more likely to be successfully grown in Southern Queensland than any other, owing to its hardy nature, and the fact that it may be dried and housed like hay, and the oil extracted at the grower's leisure, say during the winter months.

Several kinds of peppermint are indigenous to Queensland. One kind found growing on the banks of some of the Western rivers is very strongly scented, and travellers have often made use of its perfume to keep flies away, a few leaves of the plant dropped into a pint-pot of tea acting as a most effective deterrent to flies with suicidal intentions. This plant may in the future be profitably cultivated by some of the Western settlers.

Tropical Industries.

GUTTAPERCHA—ITS HISTORY.

(*From Engineering News, 26th May, 1898.*)

GUTTAPERCHA (says Dr. E. F. A. Obach, in a lecture before the British Society of Arts) was first brought to Europe by the Tradescants, in 1656. In 1845 it was reintroduced from Singapore, and in 1847 Sir W. J. Hooker gave it a name, and in the same year E. W. von Siemens used it for an insulating material on a submarine telegraph cable. The original name was *Isonandra gutta*, now altered in England to *Dichopsis gutta*. The crude commercial guttapercha contains from 1.0 to 27 per cent. of water, and from 1.8 to 22.3 per cent. of dirt. The genuine guttapercha has a specific gravity of 0.9879 at 15 degrees C.; begins to soften at 45.7 degrees C.; is pliable at 65 degrees C.; hardens in 8.6 minutes; has a tensile strength of 3,906 lb. per square inch, and an elongation of 413 per cent. Its electrical properties per "cube knot" are: Insulation at 75 degrees F.; second min. megohms 5,484; inductive capacity, 0.0549 microfarads. In England the maximum consumption was 3,000 tons, used chiefly for electrical purposes, in 1881-2; by 1896 the consumption had fallen off to about 1,200 tons. The various submarine cables in use now contain about 24,000 tons of cleaned guttapercha.

RUBBER CULTIVATION IN AUSTRALIA.

(*From the India Rubber World.*)

THE South Australian Government has granted a lease of Bathurst Island (comprising over 50,000 acres) to Mr. T. Harry, of Adelaide, and a syndicate made up from English cycle and rubber firms, acting in connection with some colonial (mostly Victorian) capitalists, has been taking steps preparatory to beginning the cultivation of India-rubber on that island on a large scale. I have been at some pains, therefore, to investigate this subject for the benefit of such *India Rubber World* readers as may feel interested.

Bathurst Island, lying sixty miles to the north of Port Darwin, the principal port on the northern coast of Australia, is generally flat and in some places low. It is in 11 degrees 19 minutes south latitude. The climate is tropical, of course, but visitors to the island assure me that the thermometer will not range above 100 degrees F. in the shade on the hottest day, nor much below 70 degrees on the coldest. The wet months are from November to April, and sometimes May.

Dr. M. Holtze, F.L.S., now director of the Adelaide Botanical Gardens, was for many years curator of the botanic garden at Port Darwin. He formed a rubber plantation of a half-acre at the latter place, and reported success with both Ceará and Pará rubbers. He reported favourably upon the soil of Bathurst Island, and recommended that the Government plant rubber and other economic trees.

The Hon. J. Langdon Parsons, formerly Minister controlling the Northern Territory of South Australia, and Government Resident of said territory, has written a confirmation of Dr. Holtze's report. Writing of a visit to Bathurst Island, he said: "The soil, when turned up, was a rich vegetable mould, mixed with fine sand . . . and, if the land were cleared and cultivated, would grow almost any tropical and subtropical plants and trees. I have no hesitation in saying that any company obtaining control of Bathurst Island can, by judicious planting, possess forests of the best Indiarubber trees."

Mr. F. W. Holder, now occupying the ministerial position mentioned above, said recently in the Assembly House of South Australia that experimental plantations were to be started in the Northern Territory, under the direction of the conservator of forests.

A widely known nursery firm of Adelaide planted 20 acres in rubber-trees several years ago, and they grew finely until, owing to a change in ownership, they fell into a condition of neglect. They were capable of yielding some rubber of good quality before they ceased to receive the proper care.

Mr. D. Le Souëf, assistant director of the Zoological and Acclimatisation Society of Victoria, on an excursion into North Queensland, found, among other trees before unknown, several kinds which "exude a milk-white sap on having their bark cut into, especially one tree with a very soft wood, locally known as the 'fly-catcher tree,' or 'milk tree,' from the fact of its bearing seeds covered with a sticky substance, which are often thickly strewn on the ground under the tree, and hold any insects that come into contact with them." It is now reported that these Queensland trees, whose sap is believed to contain real caoutchouc, are to be cultivated systematically in the subtropical districts of that colony.*

It is not felt here that the indigenous rubber-yielding trees of Australia are of value, beyond indicating the limits for the cultivation of rubber, the indigenous trees being scattered and difficult of access. All our authorities are agreed that cultivation is the thing, as conducive to the best results and most economical management. The native rubber-yielding trees that have attracted attention are the *Ficus macrophylla* and *Ficus rubiginosa*, besides other species of the fig tribe not yet identified.

I may add that in the propagation-house of the Melbourne Botanical Gardens, in Victoria, there is now growing a fine specimen of the *Landolphia*, the rubber-producing creeper of Africa.

Under the land laws of the Northern Territory of South Australia a freehold for not more than 1,280 acres may be obtained unconditionally upon the payment of \$3 per acre. Or, in case cultivation is carried on, a small annual payment per acre will be credited on the purchase price.

Melbourne, February 5, 1898.

A. N. F.

[In 1890 the late Mr. G. W. Griffin, then United States Consul at Sydney, New South Wales, wrote in an official report that the *Ficus macrophylla* was allied to the Assam rubber-tree (*Ficus elastica*), and he was informed by the Government Botanist of New South Wales that it yielded a very fair rubber. He also mentioned as a rubber-producing tree the *Ficus rubiginosa*, which is referred to by our correspondent, and the *Ficus macrophycea*, which he had heard contained rubber.]

INDIARUBBER AND OTHER PRODUCE.

THE London correspondent of the *North Queensland Herald* supplies that journal with the following interesting budget of news:—

WHAT QUEENSLAND CAN GROW.

The market for indiarubber is still advancing. A parcel, ex "Jumna" (20 bags), sold at from 2s. 8d. to 2s. 9½d. per lb. This week I had a chat with Mr. Thomas Christie, of Lime street, the drug, etc., merchant.

* On this subject Mr. F. M. Bailey, F.L.S., Queensland Government Botanist, says:—"I cannot give you any information re Mr. D. Le Souëf's 'fly-catcher tree,' or 'milk tree'; neither have I heard of any of our indigenous trees having been selected for planting with a view to producing caoutchouc. We have quite a number of trees whose seeds are embedded in a sticky substance. The tree, however, which the gentleman had in his mind when writing was a *Pisonia*, whose sticky fruits not only catch insects, but birds. There are a large number of Queensland plants which yield caoutchouc, and, probably, in paying quantity, but up to the present no systematic experiments have been carried out to prove the matter."

Mr. Christie was very enthusiastic over an important discovery that has recently been made in connection with rubber, and of which he gave me full particulars. It appears that some few months ago a traveller, in a region not very remote from the Suez Canal, came across a weedy grass with an extraordinary root—a root that grew yards and yards under ground a few inches below the surface. On examination he was agreeably surprised to find that the plant produced rubber, and subsequent investigation proved that the plant was of extraordinarily rapid growth. The rubber obtained proved to be of the very finest quality, and at the present state of the market would realise a heavy price. The plant was extremely hardy, and was admirably adapted for growing in Northern Queensland. That the plant is of recent discovery could be judged from the fact that there was not even a specimen of it at Kew Gardens. A name has not yet been bestowed upon it, but Mr. Christie, junr., is about shortly to start for the district where it is growing, and on his return I shall be able to supply much fuller details. So far as I understand at present the rubber is obtained from the rhizome, and it is of such remarkably quick growth that a full crop can be obtained from the plant at the end of the first year. This circumstance renders it particularly valuable to colonists in Mr. Christie's opinion. This "grass" grows about $2\frac{1}{2}$ feet high, and does not require much attention. It can be grown in an inferior soil to that required for the ordinary varieties, and one very important feature, from the cultivator's point of view, is that it is very easy of treatment for the extraction of the juice.

In connection with this subject, Mr. Christie informed me that a new process for separating and purifying the rubber has just been found out, and it is so simple that one wonders that it was never thought of before. The whole theory of the new system is centrifugal force, and I am told that an ordinary cream separator will serve admirably for the purpose, and the great consideration is that the operation is completed in a few minutes, and every particle of dirt is removed, whereas the old process takes days. This new system results in an increased value of the material to the extent of 25 per cent.—in other words, the rubber which at one time realised only about 2s. 3d. per lb. now fetches 2s. 11d. Messrs. Christie hope to have several specimens of the new plant I have referred to at their premises before long.

I hear that Mr. J. Hamilton, the postmaster at Cairns, has just arrived in London, and is busying himself in making inquiries in Mincing-lane circles about coffee, indiarubber, &c.

In regard to coffee, Mr. Christie is not very hopeful of a good market. Coffee, it appears, is very low in price at the present time. The market is flooded with Brazilian coffee, and scarcely anything else is sold.

Things are likely to improve very much, however, in about three years' time, the assumption being that, as prices are so low now, the Brazilian growers, who are chiefly working with borrowed capital, are bound to go bankrupt, and their misfortune will be the Queenslander's opportunity. The Brazilian growers are not making any profit out of their present sales, and cannot go on long in these circumstances. Queenslanders should bide their time for a while, and be prepared with a good article when the demand comes.

In connection with the export of tinned tomatoes, Mr. Christie was not at all enthusiastic. He showed me a tin about the size of an ordinary tea-cup containing a good quality of tinned tomatoes, which, he said, was selling for 1d., and he did not think that at the price it could possibly pay the exporter; the tin, label, etc., must cost almost 1d.

On the subject of vanilla Mr. Christie was more encouraging, and said it was a very good commodity for Queenslanders to "go in" for. It paid well, and it was one of those substances that never seemed to glut the market. No two places had a big crop at the same time, with the result that shipments were never too heavy, and prices remained firm. Mr. Christie told me that he had only just recently sold a large quantity of vanilla at from 18s. to 22s. 6d. per lb., the last-named price being an advance of quite 1s. 6d. on the average

for last year. There is a good profit on this article, too, and it is a commodity that is easy to handle. Many people gave up the cultivation of vanilla because it required, so they said, such a lot of care, but, as a matter of fact, anybody with ordinary intelligence, when once they had mastered the initial stages of its cultivation, would find but very little trouble in cultivating it. The great thing was to keep a large stock, for the demands from buyers were often very sudden and erratic. Mr. Christie said he had just sent a very large parcel to British Central Africa.

Liquorice, said Mr. Christie, would never pay the Queenslanders to cultivate for export purposes, because it could be obtained so cheaply from Italy.

COFFEE AT BUDERIM MOUNTAIN.

By A. P. CORRIE.

QUEENSLANDERS are inveterate tea-drinkers—tea dipsomaniacs, I had almost said—and it seems beside the mark to write of coffee-growing in that colony. Notwithstanding, many tropiculturists aspire to fame in the line of coffee. But they seem to lack enthusiasm, and their hopes and expectations have not yet lifted them out of the drear abode of grumblers. Their grievance is the price. It is too small; and, unfortunately, it shows a decided tendency to grow beautifully less year by year.

But, why does coffee culture languish? Why is the coffee culturist threatened with the fate of going down? The reason is that there is no adequate demand. Then demand is regulated by consumption; and there is no consumption. Tea is in possession, and possession is nine points of the law. This is just stated *a priori*.

Suppose that Queensland were to rise to one great act of self-denial and abjure tea, what would follow? Coffee would get a hearing; and if it stated its case effectually, it would get a verdict in its favour.

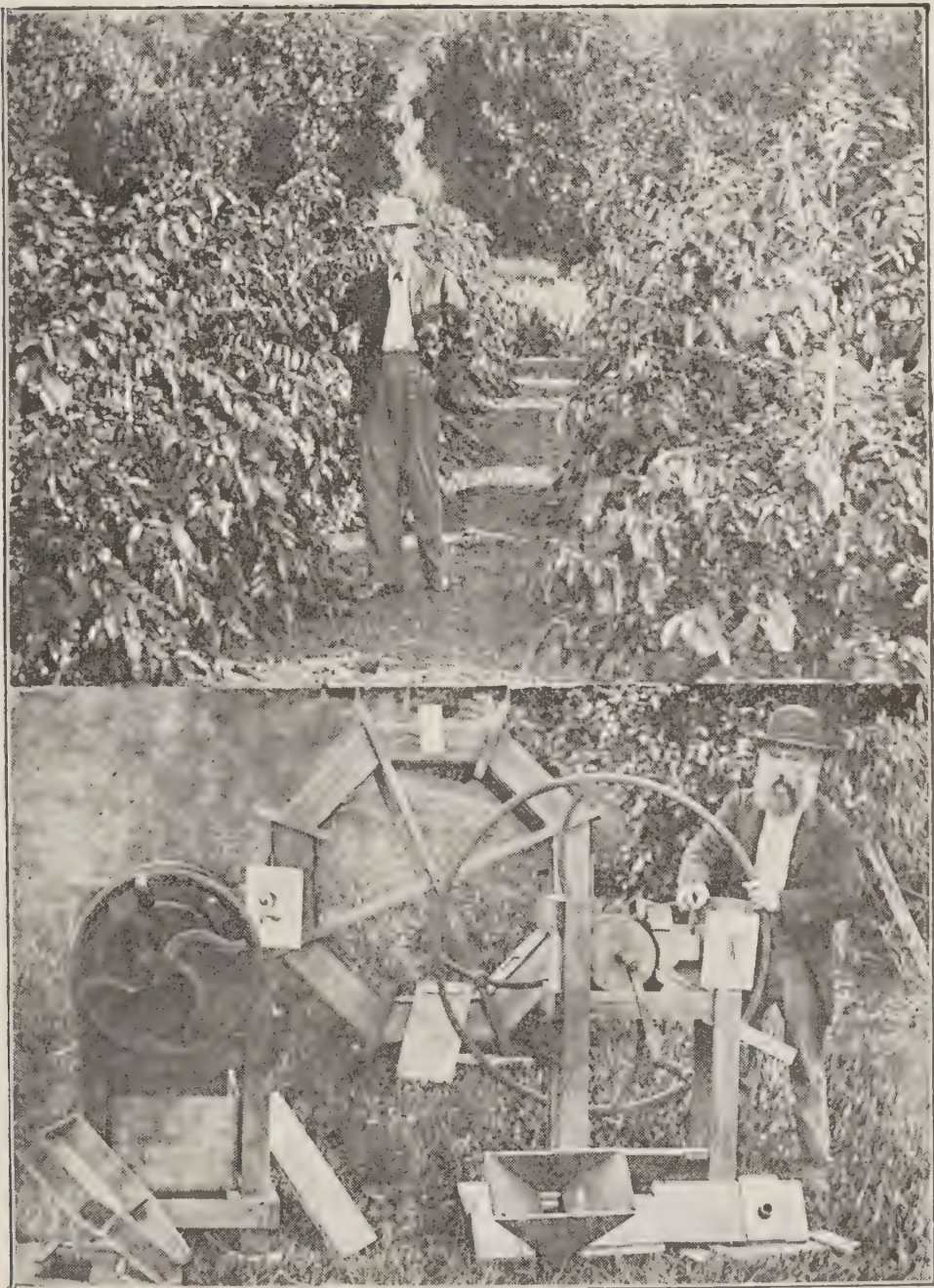
Some heroic attempts, however, have been made in the colony with the hope of establishing the coffee industry. I have knowledge of one attempt which I will describe. It was commenced some years ago at Buderim, and has not yet ended in success or failure simply because it is in a state of "suspended animation," if I may be permitted to use the term. The accompanying plate will serve to illustrate the nature and scope of the undertaking, and, also, afford some idea of the obstacles which stand in the way of the aspirant to fame in coffee production. The experiments were begun and carried on by Mr. G. A. Riebe, and are, as the illustration proves, most interesting and instructive. The contrivances were designed and made by Mr. Riebe, who had at his disposal only the tools and workshop of an amateur mechanic. That's why the enterprise is the more praiseworthy.

Let us start with the picked bean, passing over the matter of its cultivation and growth.

When the bean is picked the coffee-grower's troubles really begin, because the process which follows is long and tedious. The first thing is to remove the pulp. For this work a pulper is needed.

PULPING.

The pulper is marked No. 1 in the illustration. With the object of showing more clearly its construction, Mr. Riebe dismantled the machine. The sides and top, it will be noticed, are resting at the foot. The roller, to which are attached the handle and fly-wheel, is covered with the wire-netting similar

Plate XLVII.

COFFEE-GROWING AT BUDERIM MOUNTAIN.

to that used in the separation of sugar and molasses—that is, in the “centrifugals.” The ridgy surface of the roller shows folded strips of this netting. These strips are laid on at a sharp angle. Just under Figure No. 1 is shown the little discharge-shute.

When the berries are picked they are covered in pulp—a kind of fruity flesh. It is this substance that the machine removes, hence the name “pulper.” This pulpy envelope is red outwardly when the berry is ripe, but the berry itself, when pulped, is white. While the pulping is going on, water is kept playing upon the berries. The pulp itself is very moist, but the addition of water facilitates its removal.

DRYING.

After pulping comes drying. The berries must be thoroughly dried and seasoned before anything further is done. This process is not unlike fruit-drying, and fine wire-netting serves the purpose admirably. Seasoning can be done in a loft.

HUSKING.

The seasoning done, we move on another stage, and reach the husking. In the plate the husker is marked No. 2. As far as possible, under the circumstances, it is arranged so that the machine explains itself. In principle it is the same as the pulper; but, with reference to its work, it has a much harder task to perform. The berry, at this stage, is enveloped in a husk, or tough skin, called the parchment. This has to be broken and peeled off. The husker, like the pulper, is fed at the top, the discharge being effected in the same way in both machines.

The seeds are now winnowed, and light scaly matter is fanned away.

SILVER-SKINNING.

The coffee seed has a tedious toilet to unmake—a truth which has doubtless dawned upon the reader before this. The “parchment” is only its middle garment; beneath that is another called the “silver-skin.” As the name is suggestive enough, there is no need to describe it. This has to be removed before it can be roasted or ground. Machine No. 3 is simply a large wheel, the rim of which is built of straight and not curved sections. This does the work. The rim of the wheel is tubular, and in this space is placed the berries clothed in their silver skin—an extremely thin silvery covering. The wheel is then set agoing, and the chafing of one seed against the other, and against the sides of the tubular rim, removes this thin coating. Then the coffee seeds are winnowed once again, and the process, as far as the grower is concerned, is complete.

COFFEE-PICKING IN QUEENSLAND.

On this subject, Mr. F. Hepburn writes:—

In the *Queensland Agricultural Journal* for this month (August, 1898), a tabulated statement is given showing the cost at $\frac{1}{2}$ d. per lb. of picking “cherry” coffee on Hambledon Plantation by a gang of aborigines. In the first three days $8\frac{1}{2}$ “boys,” working $18\frac{3}{4}$ hours in all, picked 1,477 lb. 14 oz., averaging 174 lb. each picker, or 58 lb. daily. On the ninth working day the average increased: 713 lb. 5 oz. was picked by the same gang in $7\frac{3}{4}$ hours, this averaging 84 lb. Had the pickers worked a full “eight-hour” day, this, at the same ratio, would be 87 lb., or 3s. $7\frac{1}{2}$ d. for a day’s work of an aboriginal.

As the pickers become more expert, it is noticeable the high average obtained. An average of 58 lb. in first three days amounts to 84 lb. on the ninth day. In the first picking, generally one-half the entire crop is taken off in a few weeks’ time. It is not unreasonable to expect that the expertness of the pickers would result in an average of 100 lb. in a working day of eight or nine hours, which would give 4s. 2d. for a day’s work.

Most important to bear in mind is that the youth of the colony could do the work. A twelve-year-old would be equal to or even surpass an adult at picking—*vide* Mr. Bromley's statement at Rockhampton Conference of 1898, 13th May.

It is not men's work, strictly speaking; therefore a day's wage as above is more than could be expected by the picker, and would be too much for an estate to pay if the same rate of wage is expected to be obtained in the second and third pickings, when the daily averages are lessened. The following scale might be adopted:—

First picking, average 100 lb. daily;	cost picking, 2d. for 5 lb., equals	3s. 4d.
Second " " 80 " " " "	2½d. " 5 " "	3s. 4d.
Third " " 65 " " " "	3d. " 5 " "	3s. 3d.

On the above basis the whole crop would average ½d. per lb. of cherry as the cost of picking.* On a large estate of from 50 to 100 acres (this may be considered a large plantation in Queensland) arrangements could be made to give a weekly wage with rations during the crop season, or payment by results, as might be found desirable.

COFFEE IN BRITISH CENTRAL AFRICA.

(*From British Central Africa Gazette.*)

MR. D. MORRIS, the Assistant Director of the Royal Gardens, Kew, in a recent letter, says:—"It is evident that planters must adopt some means for manuring their coffee-trees if they are to keep them in a suitable condition for yielding crops. Apparently the soil is not rich enough without some manurial treatment. Also, during the dry season, the roots of the trees should be covered with grass or trash, to keep them cool and moist."

Messrs. Gardiner and Co. have issued their circular in regard to the 1897 crop and the prices obtained:—"We are sorry to have to report no marked increase in the 1897 crop over that of 1896. The quality, taking the crop as a whole, was not so good as last year, and was distinctly inferior to that of 1895. There appears to us to be a large increase of defective and light berry. Heated reds and stinkers were again present in some parcels, more especially in those parcels showing light berry. Some parcels showed a considerable quantity of chipped and bruised berry. On this account we recommend most careful pulping. A few parcels were overdried, and consequently rather foxy; on the other hand, some parcels were magnificent, and we are of opinion the finest ever put on the market."

It is now more important than ever for planters to do everything in their power to turn out a good even coloury sample in order to maintain the position which we are happy to report the highest grade of Nyassaland coffee has established for itself amongst the high-grade coloury coffees sold on the London market.

In our opinion, the greatest difficulties to be overcome by Nyassaland planters are in connection with defective and light berries which are now so prevalent, and which, to a somewhat large extent, detract from the values obtained by the different planters in British Central Africa for their crop. We have great hopes that, with the introduction of shade which is now being so extensively planted, the above defects will be eradicated.

* At the above rate, parchment coffee, when dried, costs under 2½d. per lb. When milled—parchment and silverskin removed—the cost is equal to 3d. per lb. on the commercial coffee bean. See *Queensland Agricultural Journal*, December, 1897, page 454, for tests of loss in weight during the various stages of curing.

LIBERIAN COFFEE AND INSECT PESTS.

LIBERIAN coffee has usually been considered as proof against any blight or insect attack. But by a report from His Excellency the Governor of the Windward Islands, we learn that injury has been done to this coffee by a scale insect. His Excellency says that in 1875 some trees were affected by *Hemileia vastatrix* in Liberia.

On this subject, the Director of the Royal Gardens, Kew, says:—"Sir,—I have the honour to acknowledge the receipt of your letter of December 30th (2739/97), enclosing copy of a despatch from the Governor of the Windward Islands with specimens of diseased leaves of Liberian coffee. 2 On examination here it was found that these leaves exhibited no trace of "coffee-leaf disease" (*Hemileia vastatrix*) or of any other fungus. 3. I observe that in the third paragraph of his despatch Sir Alfred Moloney makes the following statement:—"In 1875 some trees of Liberian coffee, in its home, Liberia, were affected by the *Hemileia vastatrix*. The effect was similar to what is described by Mr. Whitfield Smith"—i.e., apparently to that exhibited by the diseased leaves accompanying the despatch. 4. As the matter is of great importance I may say at once that the effect is not in the least similar. The coffee-leaf disease is a fungus which speedily destroys the tissues of the leaf and causes it to fall prematurely. The Grenada Liberian coffee, on the other hand, as Mr. Whitfield Smith correctly states, is "attacked by a scale insect." As a matter of fact, two distinct kinds have been detected:—(1) The Circular Scale (*Aspidiotus articulatus*), which is also found on the West Coast of Africa (Lagos); (2) the Long Narrow Scale, chiefly on the ribs of the leaves, (*Ischnaspia filiformis*), which is very common in the West Indies and is also found in England. 5. These scale insects, though no doubt injurious, are not to be compared for a moment as a source of danger to coffee cultivation to the coffee-leaf disease. You are aware that the progress and distribution throughout the world of this scourge to coffee cultivation has been watched by Kew with assiduous care. Originating about 1869 in Ceylon, it spread to the Malayan Archipelago in 1876, to Fiji in 1879, to Mauritius in 1881, to Natal in 1884 (*Kew Bulletin*, 1893, p. 362), and to German East Africa in 1894. But, as I stated in my letter of 16th December, 1896, it is not known to exist in the West Africa colonies. Added to this, Liberian coffee is found to be only moderately affected by it. I cannot but think, therefore, that all probability is opposed to the correctness of Sir Alfred Moloney's statement that the disease existed in Liberia in 1875, as Eastern Africa was not affected till nearly ten years later. I should be glad to know on what precise evidence Sir Alfred Moloney bases it. If true, it seals the fate of coffee cultivation on the West Coast, and seriously imperils that in the new world. 6. I enclose a memorandum of the most approved method of treatment for dealing with scale insects. 7. A honorarium of one guinea (£1 1s.) is due to Mr. W. F. Blandford (whose address is 48, Wimpole street W.) for his assistance in the matter.—I am, &c., W. T. THISELTON DYER."

MIXTURE FOR DESTROYING SCALE INSECTS.

Heat milk nearly to boiling point and mix with double the quantity of kerosene; stir briskly until a thick creamy liquid is obtained. Dilute with ten times the quantity of water. Spray or apply with a brush, keeping the mixture constantly stirred.

Sour milk is as efficient as fresh.

If milk cannot be obtained, or if the mixture is required in large quantity, a strong soap emulsion may be used in its place.

COPY OF MINUTE BY THE DIRECTOR OF GARDENS, SINGAPORE.

Hon. Colonial Secretary.

The scale insect is by no means rare here on Liberian coffee. It is usually a sign of weakness of the plant from want of nourishment. Liberian coffee is liable to a great many kinds of insect and fungus pests.—H.N.R.
—*Selangor Government Gazette*.

COFFEE NOTES.

WE have been frequently asked to give information on coffee-growing, not only in Queensland, but in other parts of the world. We therefore devote considerable space to this very important industry in this issue of the *Journal*. The various articles now published are from the most reliable tropical journals, more especially from the *Tropical Agriculturist*, Colombo:—

COFFEE PROSPECTS IN BRAZIL.

The following has been received from the British Consulate, at Santos Brazil, in reply to a communication sent by the Singapore Chamber of Commerce asking for information. The letter is being circulated to all members of the Chamber:—

1. Actual prices in Brazilian currency are still remunerative for the smaller part of production in the State of San Paulo. The greater part, say about two-thirds, however, depend on heavy interests on mortgages and excessive expenses, the more so, as during the times of high coffee—prices and prosperity—the majority of these estates were bought and laid out to culture at double and triple of actual value. Should currency rise, and prices in the consuming quarters not follow accordingly on account of the pressure of the extraordinary large stocks, a great portion of the culture would be voted to misery, principally in the more distant coffee-growing districts, where the expensive cost of transport and higher railway tariffs interfere seriously with the result.

2. The cultivation is not dependent to any appreciable extent on European capital, and only a small number of estates or plantations are worked under European management.

3. There are no prospects of cheaper labour than that furnished by the Italian immigrants. Several attempts have been made with other immigrants (Siberian, Russian), but failed completely. Japanese labour is not being employed, although there appear periodically strong endeavours to attract the Japanese immigration. Under the actual critical circumstances and the heavy crisis the country is undergoing, there is no probability of any propaganda for other immigration than Italian proving successful.

4. As stated under item 1, many estates would have to be abandoned, if actual critical conditions were to last and bring about lower prices. Even with actual value of coffee, production is most probably to be curtailed by the fact of many planters not being able to give their plantations sufficient care as to cleaning the ground and eventually manuring.

5. The reason of foreign capital not having been invested in Brazilian estates to a more considerable extent was in first place the slavery up to 1888, and since then political uncertainty and the everlasting republican troubles.

BRAZILIAN COFFEE.

Coffee-planting in Brazil has for many years completely overshadowed all the other branches of industry and agriculture in that vast country, and no check seems probable in the near future to the constant increase of the already enormous trade. Last year the exports from Rio consisted almost exclusively of coffee, the supply of which exceeded in quantity that of any previous season, having far surpassed all calculated expectations. The entries at Rio and Santos totalled 10,032,390 bags, an increase over 1896 of 2,701,584 bags, and the shipments from the two ports were 9,687,317 bags. The average value was about 36s. per bag. The unprecedented supply, greatly in excess of the consumption, caused prices to drop to a point hitherto unknown in the history of the article, type No. 7, in November, having been sold in Rio at about 6s. 6d. for 32 lb. In the same month, 1896, the lowest quotation for this quality was 10s. 2d. for 32 lb. The large increase in production is the inevitable result of the very high prices which ruled from 1887 to 1896. These prices gave an

average profit to the planter estimated at 150 per cent., and naturally stimulated planting to an enormous degree. As it requires several years to bring the coffee plant to a bearing and paying stage, the effect of the enormous extension of plantations has only been seriously felt in the past two years; but whilst it takes some years for the coffee-tree to bear, it continues to bear for many years, and therefore the low prices and depressed condition of the coffee interest is likely to continue for some time. An interesting feature of the transactions of the year is the increase of foreign capital which has been invested in Brazilian coffee plantations. It is reported that extensive properties in the States of Santo Paulo and Minas Geraes have been acquired by European syndicates, chiefly English; and it is also said that a company has been organised at Antwerp, which will have a branch at Santos for the purpose of buying coffee of the planters direct, and selling it by retail in Europe for account of said planters. The receipts of Rio this year up to 1st May were 3,896,000 bags, against 3,156,000 for the first four months of 1897.—*Grocers' Journal*, 21st May.

COFFEE IN MEXICO.

(*From the Mexican.*)

All the coast States of Mexico south of the 25 degrees are suitable for coffee culture, and the finest plantations are found about Vera Cruz on the east coast, the States of Colima and the Michoacan on the west coast, and the Isthmus of Tehuantepec.

One of the most successful coffee-growers in the republic gives his experience in its culture as follows:—

When I came to Mexico, ten years ago, I had 20,000 dollars in gold, which, by the way, is as small a sum as anyone should ever undertake the business with. Most of the failures in the coffee business, and they are many, are due to the fact that the parties have insufficient means to wait from five to seven years before realising anything from the crop. I had had some experience in coffee-growing in the Hawaiian Islands, previous to coming to Mexico, and learned some very dear lessons there, having planted my trees at too low an elevation, and lost the entire plantation from the rust which prevails at an altitude of from 1,000 to 2,000 feet above sea level, where most of the plantations located in former days.

I selected 500 acres of land in the State of Vera Cruz, among the primeval forest, at an elevation of 3,000 feet, paying 12.50 dollars in Mexican silver per acre. The land was a rich loam, rather rocky, and cost me 8 dollars per acre to clear. Thus, you see, the first outlay was about 10,250 dollars. I left trees at a distance of about 25 feet, as they were large, and I calculated that one tree would shade three or four coffee-plants. All the land was on a side hill, where drainage would be good, thus preventing too much dampness about the roots of the plants. I selected young plants from a nursery, paying about 800 dollars for sufficient plants for my 500 acres of ground. Of course, the cost was much higher ten years ago than now. The distance at which to set trees is a mooted question, some claiming that they may be set as close as 3½ feet, others say that the proper distance is 8 to 10 feet. In India and Ceylon the average distance is 6 feet, with the trees topped at about 4 feet. In Guatemala they are set at about 9 feet, and the trees allowed to attain their natural height of about 20 feet. Each planter has his own opinion, but from my experience I am convinced that 10 feet is the proper distance in this State, where the conditions are somewhat different from the west coast of the Isthmus of Tehuantepec. I set my trees in holes 18 inches deep by 18 inches square, carefully removing all stones and roots from the surrounding soil. The holes were left open for about three weeks, and the plants placed in them just at the beginning of the rainy season.

When the trees attained the age of eighteen months I had them topped to a height of 4 feet, which caused them to throw out more vigorous branches, and from these sprang "suckers," most of which I had removed. It requires

a good deal of experience to understand the principles of successful pruning—that is, to remove all superfluous wood and leave such branches as will produce the best crop. In the work of pruning comes one of the greatest obstacles to be met with in coffee culture in Mexico. The ordinary peon labourer will cut and slash the tree indiscriminately if not carefully watched, and they sometimes totally ruin the next year's crop. The work of weeding and keeping the soil free from grasses, which grow so luxuriantly in this climate, is very arduous and expensive.

The total cost of bringing my 500 acres of coffee-trees to maturity—that is, the fifth year after planting—was about 18,000 dollars in Mexican silver, which sum included my living expenses and the buildings erected on my plantation. The first crop that I gathered averaged $\frac{1}{2}$ lb. per tree, which I sold for 16 cents per lb., gold. The fourth year the production was $1\frac{1}{4}$ lb., and the fifth year showed a trifle over 2 lb. per tree, which has been the average production for the past five years. I have never lost a crop, and my trees are all healthy, and the plantation is in the best possible condition. The life of a coffee-tree is about thirty years. In the twenty-fifth year about one-half of the trees should be taken up and the ground replanted to young trees. This, of course, cuts the planter's income down to one-half for the ensuing five years, but insures the original income for the next twenty years thereafter. My income for the past five years from my 500 acres of trees has averaged 40,000 dollars, Mexican silver, from which, deducting the cost of curing the crop and care of the land, about 19,000 dollars, leaves me a clear income of 21,000 dollars, which I consider a good investment for my 20,000 dollars, Mexican silver. There are many men in Mexico who have enormous incomes from their coffee plantations, and all the old plantations are making money. On the Isthmus of Tehuantepec, which is the ideal coffee-growing country of Mexico, I personally know dozens of men whose incomes range from 10,000 dollars to 60,000 dollars per year. It is only the inexperienced growers, and those who began without sufficient capital and with no knowledge of the language or labour conditions, who are crying about there being no profit in the business.

With the exception of maize, coffee forms the most remunerative of Mexico's agricultural products. During the past year Mexico sold to the United States 32,387,823 lb. of coffee, worth in gold 4,880,895 dollars, as compared with but 18,959,467 lb., worth 3,179,578 dollars in gold in the corresponding period of the previous year. Thus, the average value of Mexican coffee during 1895 was 16·77 cents per lb., and 15·06 in 1897.

GROWING AND SEPARATION OF FIBRE, NORTH QUEENSLAND.

By E. COWLEY,
Manager, State Nursery, Kamerunga.

MUSA TEXTILIS, NEES.—(BANANA.)

In the *Produce World* (J. Haddon and Co., London) for June, appears the following:—

“Under the combined effects of the war and lower stocks than have been known in this country since 1893, the price of Manilla hemp has gone up by leaps and bounds this month. The advance has been fully £16 per ton. For whereas firsts were quoted at £25 5s. at the beginning of April, £37 10s. is now being paid. This advance is, however, chiefly owing to the action of speculators, some of whom predict that £40 per ton will be reached if the war lasts long. The demand is mainly speculation.

"In the New Zealand hemp market, also, there has been a sharp rise, in sympathy with that in Manilla fibre. Since last month fibre prices have advanced about £4 per ton. A few bales of fair to good quality have recently been offered and sold at £20 to £24, and common brown is quoted at £19 c.i.f. At the prices quoted the market is very firm, and a further advance may be looked for in case of prolonged hostilities."

Manilla hemp is produced by the plant *Musa textilis*, Nees, and it would appear to be indigenous to the Philippine Islands only. It was first introduced into Australia by the late Baron von Mueller, who says of it: "It likes volcanic forest land. Much of the fibre is exported to America for paper. About 1 lb. of fibre is annually obtained from each plant."

The Queensland Agricultural Department introduced it in 1895 to Kamerunga State Nursery, where it has thriven fairly well. Fibre has been separated from time to time and exhibited at various agricultural shows. Specimens may be seen at the Agricultural Museum in Brisbane, and quantities of plants may be obtained at the Kamerunga State Nursery.

It would seem from observations of the writer that it is an exceedingly hardy plant, and one not requiring much attention after the plantation has been formed. In some notes published in the *Kew Bulletin* for January and February of this year by Mr. W. B. Preyer, who is engaged in agricultural enterprise in British North Borneo, appears the following:—" *Musa textilis* requires a more equable climate than *Musa paradisiaca*, and does not thrive in any country where there is a distinct dry season. It also demands a good soil and a warm temperature. It does not die absolutely if exposed to a drought of two or three weeks, but if spells of dry weather occur at too frequent intervals its growth is stunted very materially; but, again, although it prefers rain every two or three weeks, it does not like a continuously wet season. Even in the Philippines its range is restricted. It is chiefly found on the eastern side, and there it only thrives really well."

As some three different forms of the *Musa* family are indigenous to North Queensland, and the trials of *Musa textilis* at the Kamerunga State Nursery have been what may be termed favourable, it would be, perhaps, not unwise to encourage the growth of this fibre plant in the Northern part of this colony.

The question of labour crops up here, as is the case with nearly all tropical products. However, as in the Philippines a very crude method of separating the fibre is in vogue, it is more than likely that some machinery could be invented to dispense with the manual labour employed there at present. As America seems to be a large consumer of *Musa textilis*, should that country become possessed of the Philippines, a revolution doubtless would be made in the mode of separating the fibre. "Simmonds" quotes the following:—"Machines have been invented to remove the fibre from the pulp, but few are used. About three years ago one was exhibited, very simple in its construction, and apparently producing results far superior to the ordinary mode of manual labour. The exhibition of this machine produced a great excitement, and it was proposed and countenanced by the captain-general to give a large premium to the inventor. The subject died away, however, and the machine disappeared from public view. It is probable that the criticism of experienced people formed some drawbacks to the perfection generally ascribed to the invention; but, without the slightest mechanical knowledge, the impression which its structure and effect made on persons capable of judging, was extremely favourable. There was no intricacy in its machinery: wood was its only material, and buffalo its moving power. A village carpenter could make one from its model, and its results were tenfold greater than by the ordinary course. It may suggest itself: Why has it then not become of general use? I cannot affirm that the model has not been applied; but there are circumstances, or influences, in regard to the natives here in the culture of this product, and indeed of all others, unfavourable to the extensive use or adoption of machinery."

At Kamerunga, this plant sometimes gives stalks 6 feet in length, but it is confidently expected that even a much greater length of stalk will be obtained in richer ground. Most writers on this subject agree that wet lands are not suitable.

Mr. W. B. Preyer says:—"Almost any land will do for Manilla hemp, as long as it is not too swampy or too steep; but it thrives best on rich flat land, and does not much mind a flood as long as the water does not stop too long on the land or leave it swampy afterwards."

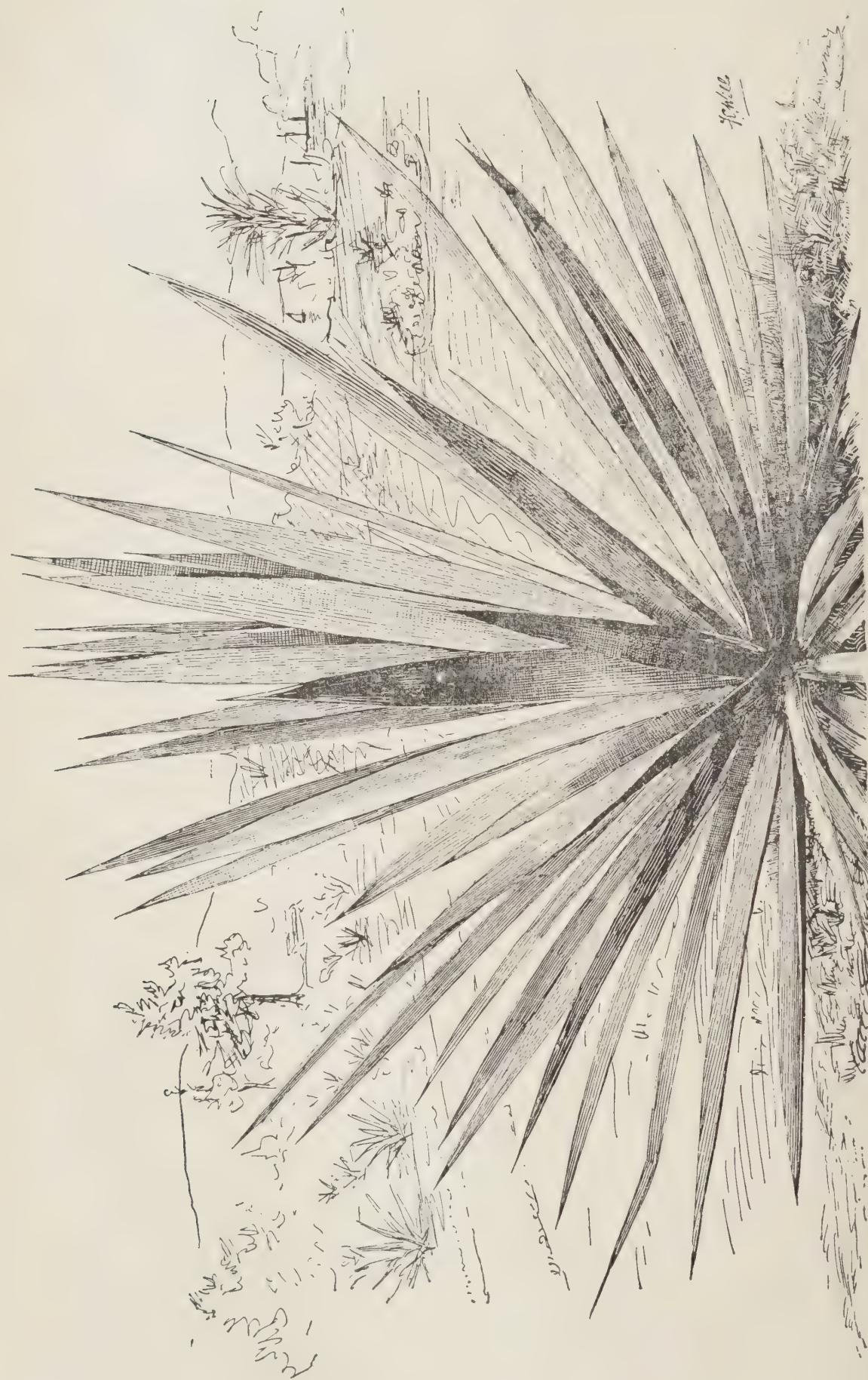
Simmonds says:—"The plant thrives best on the shaded forest-covered slopes of volcanic mountains such as abound in Albay and Camarines; on level ground, not so well; on marshy land, not at all."

The vast extent of country between Cardwell and the Daintree River would seem to be the lands in North Queensland suitable for this enterprise. The *Musa* family is well represented in three wild forms in this tropical strip. Some of the land is of volcanic origin, and seldom subject to drought.

It would seem from what M. Perroutel, Botanist to the French Government in Guadeloupe, says, that "the Abaca of the Philippines differs essentially from all the varieties of banana known. Its stem, which rises from a tuft of shoots, has a height of from 15 to 20 feet, of a dark-green colour, and very smooth on its surface."—"Cultural Industries," *L. A. Bernays*.

No other writer on the subject gives the height of the stem, and it is just possible Perroutel included the height of the leaves. A plant measured this day at Kamerunga State Nursery gave, with the leaves, a height of 14 feet and a circumference at the base of 17 inches, the weight of the whole being 31 lb. This was taken from a patch where the soil is by no means rich. The fibre contents of this stem will be extracted and sent to the Agricultural Museum, Department of Agriculture, Brisbane. The stems of nearly all the *Musa* family yield fibre of more or less value, but none so valuable as *Musa textilis*. Of the three varieties indigenous to Queensland, *Musa Banksii* appears to be the hardiest, the most common, and produces the strongest fibre. *Musa Fitzallani* has not been subjected to treatment for fibre by the writer. It is found in the Daintree district, and is said to attain a height of 20 feet. *Musa Hillii* is said to grow 30 feet high. (This is according to Baron von Mueller.) It is a native of the Daintree River district. It extends southward to at least Cairns. It is found in retired places on the banks of creeks. The writer has found some excellent specimens of this variety, but never any that reached the height of 30 feet. It is probable that here also the leaves were measured with the stalk, and the height has been given accordingly. Fibre has been extracted from *Musa Hillii*, but it does not grow in sufficiently large quantities in the Cairns district to favour the idea of economic extraction of the fibre. Unlike the other two varieties, it produces its spadix of fruit erect, and when growing in a perfectly sheltered spot it has a noble appearance. The stalk, in the Cairns district, is red, whilst that growing in the Daintree district is green; but Mr. Bailey assures the writer that it is the same *Musa*. The dried leaf-stalks of *Musa textilis* make a useful rough bandage, and twisted into ropes make very strong ones suitable for rough purposes. As many as twenty-four stems have been counted growing from one stool.

Referring again to Mr. Preyer's article in the *Kew Bulletin*, he says:—"At the age of twelve months, when the main stem will be nearly fully grown, though not fully matured, two or three others will be of considerable size, and some four or five young suckers will be coming on. In time the ground will be pretty well covered. As the older stems are cut down, the younger ones shoot up and take their place. When it has arrived at this state Manilla hemp plantations require very little attention as long as the workers do not open it up too much by cutting over many stems, or allowing the jungle plants to enroach too much. As an instance of the longevity of *M. textilis*, I may mention one stool twenty years old, which has not cost a cent, but has yielded stem after stem for treatment at frequent intervals during that period. The above remarks are based upon Manilla hemp in North Borneo."

Plate XLVIII.SISAL HEMP (*Agave rigida*, var. *sisalana*).

EXPORT OF MANILLA HEMP FROM THE PHILIPPINES.

Year.							*Piculs.
1850	...	...	...	...	...	...	124,367
1872	...	...	...	...	...	...	613,240
1873	...	...	...	...	...	...	628,066
1874	...	...	...	...	...	...	616,122
1875	...	...	...	...	...	...	519,392

From Cebu the exports were—

1874	...	...	...	...	...	...	234,361
1875	...	...	...	...	...	...	154,922

Of the 250,000 bales received at Manilla in 1864, about 129,000 were shipped to the United States and California; 114,000 to Great Britain; and the remainder to the British possessions and settlements in Australia, India, China, etc.

This article has been compiled not with any very sanguine idea that a large fibre industry may be promoted in North Queensland, because labour difficulties, if no others, stand in the way, but these may be overcome in the course of time. In New Zealand *Phormium tenax* will doubtless receive more attention than it has for some time past, and it is to be hoped the fibre industry there will expand further. There are, and have been, far less promising industries than fibre growing and separating established in Queensland; but very cautious preliminaries must be taken, and no thought of great fortunes can be for a moment entertained. Careful plodding experience is necessary in this as well as any enterprise connected with the cultivation of the soil, particularly in this colony where the unknown factors are yet to be determined. It is true the Government of our colony is ready to assist, in almost every way, efforts to develop unknown resources. In a future article other introduced fibre plants will be discussed, together with some of our own indigenous fibre-producing plants.

AGAVE RIGIDA, VAR. *SISALANA*.

Perhaps before commencing on the above subject it would be as well to quote a paragraph which appeared in *All About Colonial Produce*, which was published in that guide in 1894 as an extract from the *London and China Telegraph*:—"We learn that the first Manilla hemp ever grown in or imported from British North Borneo has just been received and sold in the London market. It consisted of only a small trial parcel, and realised prices from £22 to £24 per ton. The little trial shipment consisted of qualities ranging in colour from common brown worth about £14 per ton to fine white valued at £28 per ton, the thread of all qualities running even. The hemp, we believe, was made from stems only eighteen months old, and it is expected that the weight obtained in this instance per stem will increase as the size of the stem increases with age."

Agave rigida, var. *sisalana*, does not seem to have been well known in England a very few years ago, even as a hothouse plant. Neither Nicholson in his "Encyclopædia of Horticulture," Johnson in his "Gardeners' Dictionary," or Simmons in his "Tropical Agriculture," mention this Sisal. Baron von Mueller, however, in his "Select Plants, 1888," has the following in its regard:—" *Agave rigida*, Miller: Yucatan. The Chelem, Henequen, and Sacci of the Mexicans, furnishing the Sisal hemp. Drs. Perrine, Scott, and Englemann indicate several varieties of this stately plant, the fibre being therefore also variable both in quantity and quality; the leaves of the Sacci or Sacqui giving the largest return. The yield of fibre begins in four or five years, and lasts for half-a-century or more, the plant being prevented from flowering by cutting away its flower-stalk when very young. The fibre is straight, very glossy, and strong, particularly well adapted for ropes, as

* A Chinese weight, equal to 133½ lb.

resisting dampness. The total export from Yucatan of Sisal hemp has already reached in value half-a-million sterling (*Dr. Morris*). The leaves are from 2 to 6 feet long and 2 to 6 inches wide; the flower-stem reaches a height of 25 feet; the panicle of flowers is about 8 feet long, bearing an abundance of bulb-like buds."

The Department of Agriculture introduced to the Kamerunga State Nursery what appeared to the overseer some dried-up, worthless-looking rootlets of this plant in October, 1892. They were carefully planted, and in a very short time showed signs of life (they had been planted in a bush-house), and were soon ready for planting in the open. They have thriven wonderfully since, considering the little care bestowed on them, until at the time of writing they have probably arrived at what may be termed perfection. Four of the plants have thrown up flower-stems, which appear to be 25 feet high. An abundance of root plants grows at the base, and in some instances show above ground at some distance from the main root. A quantity of them have been distributed to various places—New Guinea, Thursday Island, and other islands in Torres Strait, etc. It would appear that these root plants offer the most ready mode of planting and propagating the species, as they appear in about four years after planting, whereas the flower-stalks develop after six years. The leaves, of which there are about 120, develop small spines on their edges after about three years' growth, while the apex is armed with a horny-like spike, very formidable. Some, that were discarded when fibre was being extracted, attracted the attention of an aboriginal, who secured them for, as he said, spear-points, for which they are very suitable. The leaves, in some measured here, attained a maximum length of 6 feet, while the maximum breadth is some 5 inches. The base of the leaf is an inch and a-half in thickness, and is convex in shape at that part, while advancing upwards it becomes concave. Its colour is a dull silvery-green; the spike is a dark-brown. Altogether, the plant is very handsome, and, apart from its economic value, would form a desirable object for a large pleasure garden, particularly when it is in flower.

The armed leaf would seem to offer itself to the matter of defence. A grove of *Agave* would be impassable to troops unless laid low by artillery. The work of destruction would in any case occupy considerable time, and so, perchance, prove a valuable aid in that particular. The plants at Kamerunga were planted at 8 feet apart, but there should be 9 or 10 feet between each plant, because the sharp end of the leaf often perforates leaves of the neighbouring plant. Perhaps this species should be recommended for planting along boundaries: no horses or bullocks could possibly get through a fence of them, if they were planted 5 or 6 feet apart. Of course some time would elapse before they were capable of resistance.

Machinery is necessary for the economical extraction of the fibre. The leaves require no rotting, the crop could be taken direct from the field to the mill, and the results dried and packed for market in a few days. The leaves should be cut before they are over-ripe, if anything erring slightly on the side of immaturity. The fibre so obtained will be finer, softer, more ductile, and a better colour than fibre from over-ripe leaves. The fibre should be extracted from the leaf as quickly as possible after being cut—the sooner the better. As soon as the leaves are cut the juice begins to coagulate and becomes gummy, thus rendering it more difficult to remove the fibre.

It might be stated here that a considerable quantity of plants are now available for distribution at the Kamerunga State Nursery.

The price of a double scutching machine is about £110 in England. This, of course, would require a 4 or 5 horse-power engine to work it.

FOURCROYA GIGANTEA, var. *EANTENAT*.

This plant supplies the fibre known as Mauritius hemp. The fibre produced by Messrs. Bourgignon and Franchet proved stronger than hemp, and resisted decay in water. M. Bouchard also testifies to the excellence of

the fibre, which he describes as "long, silky, and solid, particularly adapted for luxurious hammocks and for cordage." A native of Central America, it has been introduced into most tropical and semi-tropical countries. It will not, however, stand frost. Nicholson spells the name differently to most other writers, and tells us that the genus was named after A. F. Fourcroye, a celebrated French chemist, 1755-1809. In the specimens at Kamerunga there are some 100 to 120 leaves on a plant, each leaf being from 5 feet 6 inches to 6 feet long, and fully 6 inches broad. They are shaped like the Sisal, but have formidable, curved, upward spines along the edge, and of a somewhat lighter colour. The scape grows to some 30 feet, and produces a head of branches bearing enormous quantities of bulbils, so that it is very easy of rapid extension, as each bulbil will grow. Nothing is easier than to grow *Fourcroya* in the tropics. It has been for many years grown at Hambledon, but it does not seem to have been utilised there for its fibre. The lack of a fibre-separator in this colony is very lamentable; £200 would supply one, together with an engine that could be used for other purposes. One great feature in the growth of this fibre plant is the applicability of white labour and scientific machinery to aid in its development. No positive skilled labour would be required, except a man to drive the engine and fibre machine. Of course it would be unwise to put all trust in fibre-producing. Of one thing we are certain, it will grow as well in Queensland as in any part of the world. Samples have been prepared at Kamerunga, and sent to Brisbane and London; but what is really required is a sample of some tons to test the market. This, of course, to extract by hand would be very expensive. For small planters and agriculturists a machine is constructed to work by hand-power. This machine is said to be capable of producing 250 lb. of clean fibre in twenty hours. Its weight is 16 cwt., and the price £32. *Fourcroya* will grow on poor soil, where certainly it would not pay to grow sugar or the like. It, however, like other plants, prefers good soil. There are hundreds of thousands of acres of land in Queensland which might be given up to the growth of this plant. If used by the Government for this purpose, it would become a valuable asset, and would always be a store for labour when the unemployed are in evidence. The harvest of *Fourcroya* and the like is not spoilt by excessive rain or untoward weather. If you cannot reap this month, you can the next or next after. It is taken straight from the field into the machine, dried, put into bales, and then sent to market. What was said in regard to planting *Agave rigida* will serve for *Fourcroya*. They are allied plants. The same distance apart may be given, and the same machinery will answer. The fibre markets of Great Britain, Europe, and America, like all other markets, are liable to times of depression and reduction of prices. But times of very high prices, as the present, occur, and fortunate is the man who has a few thousand bales to send to market. Our own Australian market is not a mean one, and the local material, if as good as the introduced, would doubtless assert itself therein. *Fourcroya* grows best in tropical Queensland, but it may be grown anywhere north of Brisbane. An easy access to the plantation from the coast is an advantage where large quantities of material have to be handled for shipment. Perhaps no proposed industry offers itself so favourably to groups of farmers, who could have a central mill (their own for preference) and grow, say, 5,000 acres of *Fourcroya* and Sisal hemp. So far as it appears, no industry of this kind has been undertaken in Queensland. It does not attract itself. No one has ventured to make it attractive by trying with favourable circumstances.

Fibre has been separated by hand of a good marketable quality, both as to colour and texture, at Kamerunga.

It must not be forgotten that these fibres sometimes enter into paper-making requirements, and that they are not confined to rope-making and other coarse material manufactures. Fibre-extracting machinery is well up to date; and there would be no difficulty in obtaining extractors suitable for any kind of fibre plant. The beauty of fibre-extracting from *Agave rigida*, *Fourcroya gigantea*, and *Musa* is that they require no rotting. In this they have advantage over many other hems.

Science.

ADULTERATION OF FLOUR.

OF all the staple cereals used by the human race for food, maize is undoubtedly the cheapest. In this colony many people prefer maizemeal porridge for breakfast to the stronger and more heating diet of oatmeal. In the North of Europe, especially in Russia, Sweden and Norway, and the North of Germany, rye is greatly used. Still farther north, in Lapland, cereals are scarcely known, and the inner bark of a fir-tree, dried, takes its place. Here it is customary, when describing a rich man, to say, "He eats white bread all the year." "Corn" bread—that is, bread made of maizemeal—is largely consumed in the United States, but although maizemeal has been occasionally made into bread in Queensland, we have never heard of its becoming a substitute for wheaten bread, nor even of its adoption for the various forms of cake so common in the United States.

Maize is much consumed in Italy, but apparently with bad effects on the human system. The *Farmer and Stockbreeder* (London), writing on the subject, says:—

The second point that needs looking into is, the ill effects said to follow on a maize diet. In Italy there are diseases diagnosed as exclusively caused by maize, while in our own country the extensive prevalence of diarrhœa, dysentery, and a like class of maladies in prisons is said to be due to the employment of maize as food for prisoners.*

The Italians' trouble, however, is stated to be the result of damaged or sprouted maize being used for food, while the prison matter requires much fuller investigation than it has hitherto received.

What the chemist has to tell us is briefly this: That maize is rich in oil and starch, poor in gluten; that it is far poorer than wheat in flesh-forming material, yet not so poor in that respect as rice. From these premises the doctor who makes a speciality of dieting will be able to give us some idea of how far men should be fed on Indian corn.

The third point dealt with is that of adulteration.

Even if the maize be as healthy as wheat, the consumer does not wish to pay double prices. A wheat loaf [weight not stated—Ed. *Q.A.J.*] cannot well be made at present under 6d., but a maize loaf will yield a handsome profit at 3d.; the temptation to adulterate is therefore very considerable.

In telling one form of flour from another, recourse is usually had to a microscopic examination of the starch granules.

Wheat starch consists of smooth circular globules of two very distinct sizes, some large and others noticeably small; but the two types do *not* tend to run into one another. In other words, if the diameter of one small granule be taken at unity, that of a big granule will be about 10, and granules from, say, 3 to 6 or 7 in diameter will not as a rule be found. Rice starch consists of very small granules exclusively. Maize starch consists of polygonal, angular, and, for the most part, large-sized granules.

While matters were in this stage, it was clear that the analyst could quickly tell if the flour was composed of wheat, rice, or maize.

* This statement we can distinctly corroborate. When the Editor of this *Journal* first started farming many years ago in this colony, he and his partner always breakfasted on maizemeal porridge, and constantly suffered from such ills as above described. On abandoning the maize diet, no unpleasantness was experienced.

But the adulterator has now learnt to break up, or "explode," the starch granules, so that the microscope is defeated. At least, this is what we hear. . . . The rapid strides made in adulterating wheat with maize flour argue the removal of restraints which were till quite recently in existence. The consumer should not be called upon to pay for the product of maize flour at £8 per ton, as though it were obtained from good wheat flour now quoted at exactly double that price.

Animal Pathology.

ON THE TREATMENT OF HORSE MANGE.

By J. SIDNEY HUNT, M.R.C.S.,
Government Pathologist.

TIME was, ten years or so ago, when the subject of mange in horses—"Queensland Horse Mange," as it was rather invidiously called—attracted a good deal of attention. Nowadays it has fortunately—or unfortunately, in relation to greater ills that have come upon us—become a matter of comparative insignificance. The trouble is also less prevalent, horses less valuable, and owners, perhaps, less particular. It still lingers, however, and, judging by the applications received from time to time for an effectual remedy, is still a source of some loss or annoyance to owners. The following note of what has been found by the writer an effectual method of treatment may therefore be worth recording.

In order to make clear the *rationale* of the treatment to be recommended, it is, however, desirable, in the first place, to describe briefly the nature and cause of the affection. Without a knowledge of these things it is impossible to understand the "how" and the "why" of any proposed remedy, or even, intelligently, to apply it. And the object of this paper is rather to point out the principles of rational treatment than to add another to the hundred-and-one more or less empirical specifics that have already been advocated.

Horse Mange has been shown* to be due to the invasion of the skin by a minute vegetable parasite—a form of fungus growing like a "mould" in the crypts or follicles in which the hairs are embedded, involving the hairs themselves, and spreading out on to the surface of the affected skin, where it forms an important part of the little scales or scabs, which are so characteristic a feature in typical cases of the disease. The fungus, though fine, can hardly be called a microscopic object, for, when looked for in a suitable way, it can quite well be seen with the naked eye. One way to find it, is to pick off one of the thickest scales or scabs, and soak it in a weak solution of potash (or ammonia,

* Tryon (H.): "Special Interim Report on the origin and nature of a disease at present existing amongst the stock of the colony, and commonly known as "Mange." (*Preliminary Report of the Board appointed to make full inquiry into the Origin and Nature of a prevalent Disease affecting Stock commonly known as Mange.* Parliamentary Papers, C.A. 12, 1888. *Op cit.*, pp. 119-28.) The facts set forth by Tryon in his lengthy memoir on "Mange," regarding the particular vegetable parasite that he regards as casually related to the disease, are not quite in accord with those given expression to in this article. In the section, however, of his report that is devoted to "Treatment," he advocates, as does the present writer also (*postea*), the use of mercurial salts, dwelling especially on albuminate of corrosive sublimate and citrine (nitrate of mercury) ointment.

"On the Nature of Horse Mange." *Australian Pastoralists' Review*, 15th February, 1893. (By the present writer.) The main facts as to the nature of the disease, and the illustrations, are here reproduced from that article, by the kind permission of the proprietors of the *Review*. The fungus of horse mange had been previously noted not only by H. Tryon, the Government Entomologist, in 1888, and by Mr. J. Haslam, in horses similarly affected in India, in the same year, but it was also referred to by Mr. Irving, of Brisbane, in a paper published in the *Annual Report of the Department of Agriculture* for 1889-90.

which does not answer quite as well) for twenty-four hours or so. By this means all the fatty matter, epithelial cells, and granular *débris*, which make up the bulk of the scale, are, as it were, dissolved away, and only the fungus itself is left—much in the same way that the framework of a leaf may be obtained by dissolving away its softer parts, by prolonged maceration in water. The fungus, when thus obtained from a scale, appears as a fine net or morsel of tangled seaweed, which can be picked up on the point of a needle, and further cleansed by rinsing in clean water. Under a low power of the microscope it will be seen to be made up of innumerable interlacing fibres, technically known as a *mycelium* (see Fig. 1, Plate XLIX.)

If an attempt be made to tease out this network with a couple of needles, it will be found that the fibres of which it is composed are quite tough and resistant.

Another way to study the fungus is to grow it artificially; all that is necessary to do this is to plant one of the scales or scabs on some substance which will afford it moisture and nourishment. The sloping surface of a test tube of nutrient *Agar-Agar** mixture, such as is employed by bacteriologists for the cultivation of microbes, answers splendidly. It has also the advantage that, being transparent, it permits of the growth of the fungus being easily seen, and even watched from day to day. If a mange scale, so planted, be examined at the end of twenty-four hours, a zone of common microbes, all manner of which are of course abundant in the scale, will be seen to have grown around it, and these organisms will continue to gradually spread from its edge. About the fourth or fifth day, however, if the tube be held between the eye and the light, very fine, transparent, hair-like processes may be detected shooting out from beneath the zone of common microbes that surrounds the scale; these are the mycelial hyphæ of the mange fungus. Once they emerge from beneath the growth of adventitious microbes, they quickly extend till they come in contact with the sides of the tube, and then turn upwards into the air. Soon the surface of the jelly becomes covered with the growth, and the hyphæ, shooting upwards, give it a soft, pure-white, blanket-like appearance. In a few days this blanket will have grown to the thickness of a quarter of an inch, looking for all the world like a layer of snow-white cotton-wool. A morsel of this can be removed with a sterilised needle and transferred to a fresh tube of jelly, and this can be repeated as many times as may be necessary till a perfectly pure growth of the fungus is established. If, after being planted for a few days, the scale is picked off the jelly, treated with potash as already indicated, and then placed under the microscope, it will be found that the ramifying hyphæ described are in direct continuity with the fibres which were before stated to form the basis of the scales.

The fungus grows even more quickly when kept at a temperature of 90 degrees to 100 degrees Fahr. Sunlight, too, seems to stimulate its growth, and a considerable amount of moisture is also advantageous to it. Air (or oxygen) is necessary to it; it will not develop if planted at a depth in the jelly, and a layer of olive oil poured over it at once arrests its growth—a fact which explains the *modus operandi* of greasy applications in the treatment of affected horses.

With a view of ascertaining if the fungus were capable of growing and producing mange in healthy horses, the following experiment was made:—The skin of a healthy horse was lightly scratched or scarified with a lancet in two situations, and a little of the fungus, from a pure artificial culture, was then smeared over the spots. The scabs and scales, typical of horse mange, showed themselves on the parts thus inoculated; and when, at the end of three weeks, small portions of these were examined microscopically, they were found to be made up of the same fungus, and artificial cultures were again established from them. The disease did not, however, appear to spread beyond the points inoculated, possibly because the weather at the time was cold and dry—

* This is essentially a clear soup, made into a jelly with *Agar-Agar* (Japanese isinglass).

conditions very inimical to the growth of the fungus. Moreover, it is well known that horse mange tends to die away in the winter, only to reappear after the summer rains; that is to say, when the conditions of warmth and moisture stimulate its growth, and quicken the spores which have been lying dormant (?) during the winter months. Where horse mange is prevalent, spores of the fungus must almost certainly be constantly deposited on the skin of healthy animals, especially where the healthy and affected run in the same paddock, or work in the same harness, and it seems, at least possible that these spores are only effective in producing the disease when the conditions of warmth and moisture are sufficiently favourable. A dirty state of the skin would also appear, both from theory and experience, to be a most important condition, as affording a favourable soil in which the fungus can more readily get a footing; and a dirty, scurfy skin is frequently associated with an unhealthy intestine.

The growth of the fungus and its spore formation can be well observed by the following method:—A drop of liquefied jelly is placed upon a cover-glass, and inoculated with a particle of a pure growth of the fungus. The cover-glass is then inverted over a hollowed-out glass slide, the edges of which are greased or cemented to the slide. Thus an air-tight cell is formed, which can be placed under the microscope, and the whole process of growth and development watched from day to day and from hour to hour.

First, fine segmented hyphæ shoot out through the jelly (Fig. 2, Plate XLIX.), growing so fast that, when the growth is in full swing, an individual hyphæ can be seen to make a perceptible advance across the field of the microscope in the space of five minutes.

Two forms of seeds or “spores” are seen to be produced: A semilunar form, springing from the surface of the hyphæ, sometimes singly, and sometimes in clusters like bunches of bananas; and a round form, developed in the substance of the branching rootlets (hyphæ). (See Figs. 2, 3, 4, and 5, Plate XLIX.) If at this stage of affairs the cover-glass (with the jelly and growth adhering to its under-surface) be raised for a moment from the little well or depression in the slide over which it has been inverted, and a droplet of water placed in the well to afford moisture, it will be seen that both kinds of spores commence to germinate, as seen in Fig. 6, Plate XLIX.; and that eventually a large number of the crescentic kind of spores are reproduced (Fig. 7, Plate XLIX.). For these developments a certain degree of warmth, as well as moisture, is required.

The significance of these two forms of spore formation has not been ascertained: possibly one is what is called a resting spore. But the two forms have unquestionably some well-defined purpose, and it seems at least possible that they indicate that the fungus undergoes some alternate form of development, quite unlike what we recognise as the fungus of horse-mange, on some other host than the horse—perhaps on some plant: just as certain fungi which cause “rust” in wheat do, in Europe under certain conditions, as has been affirmed by some investigators, undergo an alternate form of development on the leaves of the Barberry, before they can reproduce the kind of spores which can in turn infect the grain crops; or as certain others which attack the pear-tree undergo alternate development on the Juniper. The discovery of an alternate host of the mange fungus, in the vegetable world, would explain the purpose of the two kinds of spores produced, and also of the fact that mange does not appear to be readily spread by direct contact from affected to clean horses (?).

This, however, is, by the way, and must be regarded merely as a little trespass into the seductive region of speculation. What concerns us particularly to know is that certain spores are produced, and are lodged in and about the hair follicles; and that, under suitable conditions of warmth and moisture, as during and after a wet season, they germinate, and, in so doing, send rootlets (hyphæ) down into the more sensitive parts of the hair follicles, setting up

intense irritation, and causing a reappearance of the disease—a circumstance which has led many owners to regard mange as an incurable affection. This outline of the nature of the disease suggests, at any rate, three qualities which an effectual remedy should possess:—

1. It should be destructive to the life of the fungus.
2. It should have also a penetrating nature, to reach deeply into the hair follicles.

3. It should be of such a kind as not to be easily rubbed off or washed off by the rain, so that in the case of bush horses (for which a remedy is chiefly required) one or two dressings will suffice. Here is the prescription which was designed to meet these requirements:—

Oleate of mercury (10 per cent.)	...	...	...	6 oz.
Common resin	...	...	...	4½ drams
Common turpentine	...	...	...	¾ oz.
Common kerosene	...	...	...	¾ oz.
Linseed oil (raw)	...	...	...	12 oz.

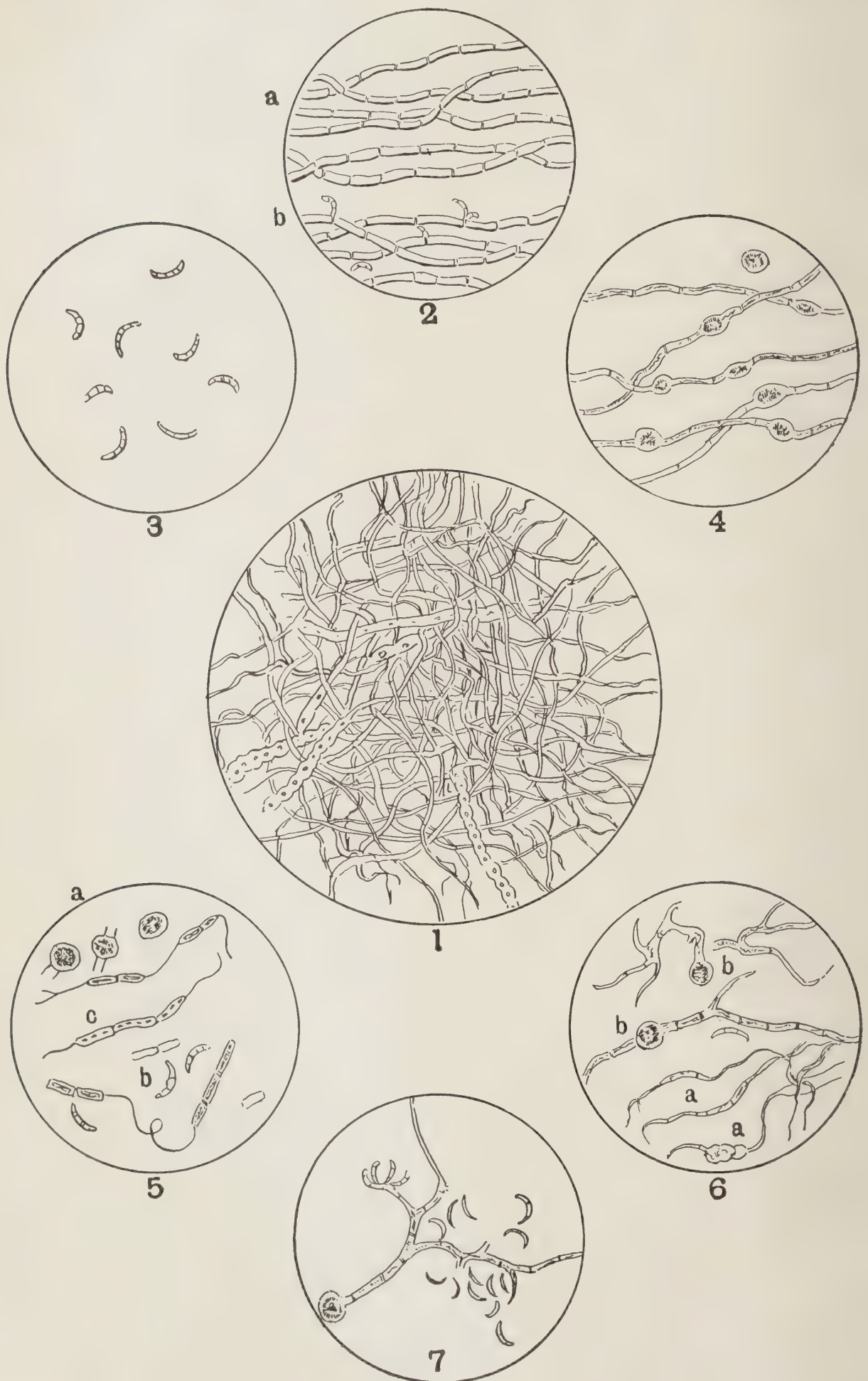
Directions for Mixing.—1. Dissolve the resin in the turpentine, and add the kerosene. 2. Mix the oleate of mercury and linseed oil. (If the oleate is recently made with heat, the oil should be also warmed to prevent precipitation.) 3. Add the two former solutions together.

The mercury is employed to fulfil the first requirement mentioned; oleic acid (combined with the mercury as an *oleate*) and kerosene are added for the second; and resin, dissolved by means of turpentine, for the third. Linseed oil is used as a vehicle in which to dilute the other ingredients, and to make up the required bulk. It is not intended by any means to assert that this prescription best meets the requirements suggested, either in regard to the particular ingredients employed, or as to the proportions of them indicated; only that it was designed to meet these requirements, and has been found practically effective by the writer in horses of his own, and in those of friends who have employed it.

If the principles of treatment suggested are correct, it is obviously open to anyone to modify and improve the details of the method.

Before applying this dressing it is advisable, though not absolutely necessary, to first thoroughly cleanse the horse by scrubbing with soap, soda, and hot water. The animal should be thoroughly dry before the dressing is applied. It should be applied freely and thoroughly to the mane, tail, and other affected parts, and well rubbed in with a stiff brush. It causes a certain amount of soreness, especially if used about the head, so that even quiet horses sometimes resent the application of a bridle for some days afterwards; it also makes them unsightly, sticky, and unpleasant to handle. A second dressing should be given in about a fortnight; and even a third, in bad cases, at a rather longer interval.

The application adheres like a coating of paint—it is, practically, a penetrating, fungicidal paint—and only comes off when the hairs and scales of skin come off with it; and then is the time to reapply it, so as to completely destroy any remaining spores that may be deeply embedded in the follicles. In regard to the important question of cost: Oleic acid and yellow oxide of mercury are worth, respectively, about 2s. 6d. and 6s. per lb. The two can be bought, already combined, in the form of oleate of mercury (10 per cent. strength), for 8s. or 9s. per lb. The other ingredients—resin, kerosene, turpentine, and linseed oil—are too cheap and familiar to require further mention. A pint of the dressing—which should more than suffice for the cure of any one horse—can be made at home for about 3s. 6d. or 4s.; but as it can be obtained already compounded from a pharmaceutical chemist for very little more, it would hardly be worth while to go to the trouble of making it at home. In any case it is far from an expensive remedy.

Plate XLIX.

In connection with the treatment of horse mange, it may be of interest to mention that the first "dip" constructed in the United States was designed and employed by Mr. R. Kleeberg, of Santo Gertrudes Ranch, Texas, not for the purpose of cleansing cattle of ticks (to which it was afterwards applied), but for the treatment of *psoroptic mange* in horses, a complaint which appears to be closely related to, if not identical with, the malady with which we are familiar in Queensland horses.

EXPLANATION OF PLATE.

FIG. 1. Horse mange fungus.

- „ 2. a. Growing hyphæ. b. Shows crescentic spores growing from between segments of same.
- „ 3. Crescentic spores more highly magnified.
- „ 4. Round spores developed in the substance of the hyphæ.
- „ 5. Final stage—showing degenerated remains of hyphæ and spores of both kinds.
- „ 6. Germinating spores.
- „ 7. Showing abundant development of crescentic spores.

THE IMPORTANCE OF INOCULATION BY TUBERCULIN TO COMBAT AGAINST TUBERCULOSIS.

ON this subject, the District Veterinary Surgeon, Dr. Weisheimer, on behalf of the Agricultural District Society at Darmstadt, delivered the following lecture. Having opened his discourse by mentioning the liberal aid given and care taken by the Government to encourage the breeding of cattle, the lecturer continued:—

In order to avoid carrying on farming and breeding of cattle at a loss, it is necessary to make careful and correct computations. For instance, a milch cow costs £18 per year for feeding. To arrive at this cost only, she must produce 2,000 litres, equal to about 450 gallons of milk. Frequently, the quantity produced is below this. (For instance, in 1876, an average of 1,650 litres, equal to about 335 gallons only, was produced in the district.) This proves that the farmer made no profit, but a loss. To obtain good results it is absolutely necessary to breed the best cattle only. By doing this, with the same feeding and labour, better results as to quantity of milk can be obtained, and the prospect of selling her profitably later on will be greatly improved. The question, however, is where the means are to come from to pay the outlay for feeding during sickness, and other expenses.

Statistics have proved that half the cattle in the German Empire are affected with Tuberculosis. Also, in the duchy of Hesse and the district of Darmstadt the proportion reaches a total of 14 per cent. in the two latter States. Even 50 per cent., however, compares favourably with the loss in some places, seeing that in one locality alone, out of a loss of £125, £75 was accounted for by Tuberculosis. In consequence of these great losses, the Cattle Fund ceased to give any further guarantee for any cattle or cows affected with this disease.

To discover ways and means to remove the cause of these great losses, is therefore one of the first duties of the farmer. The greatest danger of Tuberculosis lies in its infectious character. On one farm no less than 50 per cent. of the pigs were discovered to have the disease. In the whole district it amounted to 3 per cent.

To the human being, the disease is transferred by drinking the milk in its natural state (unboiled). For example: In a boarding-school, six girls died out of twelve. The *post-mortem* examination proved that the cause of death was the existence of Tuberculosis in the bowels, caused by the drinking of the milk from a cow suffering from Tuberculosis in the udder.

By the use of inoculation we have now the means at hand to fight successfully this dangerous enemy of our farmers.

At this stage the lecturer illustrated the cause of the disease and its nature. He produced a small bottle of Tuberculin, diluted with nine times its quantity of 6 per cent. Phenolwater, to be used for inoculation. This fluid is injected beneath the skin at the neck in small quantities by means of a special instrument after the normal temperature of the body (in comparison with other animals) has been obtained. The lecturer described this small operation as simple, although some caution and dexterity must be exercised in the cutting. There is no danger attached to the animal. Dr. Weisheimer had operated upon 300 animals in the district, and Dr. Friedrich upon 3,000 in the district of Duberg.

After the inoculation (which the lecturer generally performed after 6 o'clock in the evening) it is necessary to take the temperature of the animal by means of a maximum thermometer, the first reaction being observable about fifteen to eighteen hours after the inoculation, and the temperature should then be taken again at intervals of three hours. Animals who reach a high temperature (fever heat)—40 degrees 41 minutes and up to 41 degrees 5 minutes—are afflicted with Tuberculosis. It must, however, be remembered that frequently affected animals show no outside signs of illness, and feed well. It is the duty of a farmer to separate at once the animals so affected, and if possible to place them into separate stalls, and some distance away. The stalls must be well cleansed with boiling water and soda.

The value of inoculation has been fully recognised in other States—for instance, in Switzerland and Denmark—and good results also have been obtained in some States of Germany. The Government of Bavaria issued proclamations to the effect that the State would pay for the cost of inoculation, especially on such farms where the milk is sent away in its original state. Similar proclamations have been issued in Hesse by public bodies which had been established for the purpose of selecting the best animals for inoculation.

The Government intend shortly to issue such orders as will assist to exterminate effectually this pest. Some months ago the Agricultural Society at Darmstadt instructed several boroughs to buy only such stud-cattle as have been proved to stand the test of inoculation with Tuberculin.

The majority of the boroughs therefore will, in future, procure only such animals as have been inoculated and are free from Tuberculosis. Breeders will consequently be obliged to destroy all afflicted animals. The absolute necessity of inoculation has been proved by results. On one farm alone Dr. Weisheimer was successful on 13 out of 15 animals, and in other localities 6 stalls out of 9 were free from the disease.

There can be no doubt that, since the practice of inoculation has been introduced in Hesse, cases of Tuberculosis are not so frequent there as is the case in Saxony. The extermination of the disease is not so very difficult when proper remedies are adopted.

The lecturer then spoke about the danger of infection to the human being, especially of its effect upon the digestive organs, and reminded farmers that it was their duty to provide pure milk and other dairy products free from germs, as these products are much in use for local consumption in the neighbourhood. It would be useless for farmers to defer action, as the Government is bound to issue regulations permitting the sale of milk from healthy farms only. Already, in some districts, all milch cows are under the supervision of a veterinary surgeon. He pointed out the stringent regulations in use in Frankfort with regard to the sale of milk (published in January last).

There are altogether so many weighty reasons for immediate action that private owners and public bodies should no longer delay to avail themselves of the assistance offered by the Government to at once take in hand the solution of this question.

Burgomaster Lang presided at the meeting, and moved a vote of thanks to the speaker for the very interesting lecture. The discussion which followed was animated. The question of meat inspection was brought forward, and the

regulations referring thereto discussed, they being of such vital importance in the interest of agriculture and national economy both in Prussia and Hesse. They also recommended a liberal distribution of Tuberculin in cases where inoculation had failed. A motion was also carried, recommending that it would be desirable that the cost of inoculation should be borne by the State.

Tick Fever.

DR. SIDNEY HUNT, Government Pathologist, writing to Mr. P. R. Gordon, Chief Inspector of Stock, on the subject of the protective value of inoculation, says :—

Yeppoon, Rockhampton,
8th July, 1898.

The experiment I mentioned to you, of testing once more the protective value of inoculation by exposing inoculated animals in a place where susceptible cattle are known to promptly contract the fever and die, has, through various accidental circumstances, not turned out so completely satisfactory as one could have wished: accidents, which seem inevitable under the conditions in which the experimenting has to be done, have, as so frequently happens, come in to spoil the results. Fourteen bullocks and a bull, all of which had been inoculated some time ago at Mr. Archer's cattle station on the Gladstone road, were brought thence on the 4th June, and exposed for test purposes in a virulently infested spot at Gracemerc. Unfortunately, they effected their escape soon afterwards, and got amongst the peach-poison on the adjacent hills, with the result that several of them got very sick. One (No. 1) became blind and fell into an old shaft, whence he could not be extracted. A second (No. 8) died directly from the results of the peach-poison: he never had any fever whatever. A third (No. 6), that had shown symptoms of poisoning for some days, eventually developed high temperature and died—or, at least, disappeared—for neither he nor his carcass could be found, though the man in charge assures me he is certainly dead, and is convinced that he died of "tick fever." All the others remain perfectly well, though covered with ticks. None of them have had any signs of the fever. For the purpose of report, these accidents have, of course, to a great extent spoilt the experiment. Still, I think it is of value for our own information. When we remember that of the 10 not inoculated Boolburra cattle exposed some time ago in this same paddock *all* got high fever, and 6 died, and of the 7 adult cattle brought from St. Helens *all* had high fever and 4 died, the protective value of the inoculation of 14 bullocks and the bull employed in this experiment is, I think, evident, for one only out of the 15 animals had any fever at all. That one died; but how far its illness and death were directly or indirectly due to the peach-poisoning is quite uncertain. Let us, however, say he certainly died of Texas Fever. Even then the results are very strongly in favour of inoculation, thus :—

Of the *not* inoculated cattle from Boolburra and St. Helens placed in this paddock some time ago, 100 per cent. had fever; of these inoculated cattle placed in the same paddock, only 7 per cent. had fever.

Of those *not* inoculated cattle, 60 per cent. succumbed; of these inoculated, only 7 per cent. succumbed.

Hence the inference, even from this most unlucky experiment, appears to be that where 100 per cent. of susceptible cattle will contract fever, only 7 per cent. inoculated will do so—or a difference, in this respect, of 93 per cent. in favour of inoculated animals. And that where 60 per cent. of susceptible cattle will succumb, only 7 per cent. of inoculated will do so—or a saving in the death-rate of over 50 per cent.

It should be mentioned that the cattle used in the present experiment were very wild, so that they were with great difficulty yarded and got into the crush. For this reason the daily process of temperature-taking, together with their constant efforts to escape from the paddock, made the test of exposure to virulent ticks, in their case, a particularly severe one.

It should also be explained, in reference to this experiment, that some time ago an attempt was made to determine definitely whether the quantity of recovered blood injected had any bearing on the amount of reactionary fever produced. With this object, 15 bullocks were injected with 40 c.c., 15 with 10 c.c., and 15 with $\frac{1}{2}$ c.c. of the same recovered blood. The temperatures were not recorded, but the animals were observed daily by Mr. James Armstrong, of Messrs. Archer Brothers' cattle station, who is a very careful observer, and has had a great deal of experience in inoculating cattle. He noted that they all showed distinct reaction, but he was unable to detect any difference in the amount of sickness in the different groups inoculated, respectively, with 40, 10, and $\frac{1}{2}$ c.c. None died.

The inference, as far as this particular experiment went, was, obviously, to the effect that the quantity injected has no relation to the amount of reaction produced.

It still remained, however, to ascertain if there was any difference in the protective efficacy of the different quantities employed, and this was the primary object of the present experiment. Five of the 14 bullocks tested were from the group that had been inoculated with 40 c.c., 5 from that done with 10 c.c., and the remaining 4 and the bull had received $\frac{1}{2}$ c.c. No. 1 (that became blind, and fell into the shaft) and also No. 8 (that died of the peach-poison) were both of the group inoculated with 40 c.c. The animal believed to have died of tick fever was of the group done with $\frac{1}{2}$ c.c. I do not, however, think that this circumstance is sufficient, in itself, to warrant the conclusion that inoculation with $\frac{1}{2}$ c.c.—when followed by reaction—is generally of less protective value than where larger quantities are used.

One other word of explanation seems necessary. In referring to the cattle brought down from St. Helens and exposed at Gracemere some time ago, you will notice that I have classed them with the cattle from Boolburra as "*not* inoculated." I have done this because, as events showed (as stated in report already forwarded to you of those experiments), they were, to all intents and purposes, in the same position as though they had never been inoculated at all. They had been injected only with blood of tick-infested Boolburra cattle, which, though grossly infested for some time, had never had Texas Fever amongst them, and were themselves (as also shown in the report just referred to) as susceptible to that disease as clean cattle. The injection of 20 c.c. of this Boolburra blood caused no reaction, and afforded no protection. It was not in any sense "recovered blood." I have, therefore, here spoken of the 7 St. Helens cattle, that had been injected with it before they were subjected to the ticks at Gracemere, as "*not* inoculated" cattle.

TICK FEVER EXPERIMENTS.

Yeppoon, Rockhampton,
27th July, 1898.

The following report to the Chief Inspector of Stock, by Dr. Sidney Hunt, of three experiments recently carried out by him at Gracemere, has been handed to us for publication:—

The respective objects of these experiments were to ascertain—

1. If it is possible to protect clean cattle against tick fever by inoculating them immediately on arrival on virulently infested country.

2. If it is possible to protect clean cattle against tick fever by dipping them in an arsenical dip immediately on arrival on virulently infested country, and at frequent intervals thereafter.
3. If it is possible to protect clean cattle against tick fever by administering large doses of quinine at regular intervals.

The results of these experiments are detailed in the following tabular statements. From them it will be seen that the methods adopted have, in each case, completely failed to effect the object sought.

EXPERIMENT A.

To ascertain if it is possible to protect clean cattle against tick fever by inoculating them immediately on arrival on virulently infested country. (N.B.—The cattle for this experiment were brought from St. Helens on 11th June, and inoculated within an hour of leaving the railway trucks. The history of the animal from which they were inoculated is stated beneath the table of the experiment.)

Brought from St. Helens and Exposed at Gracemere.		First Showed Sickness.	Died On.	Never Showed Sickness.	Present Condition.
Inoculated with 10 c.c. blood from Recovered Boolburra Bullock on 11th June.	1	26 June ...	30 June		
	2	26 " ...	2 July		
	3	4 July ...	9 "		
	4	4 " ...	10 "		
	5	Not seen sick ...	10 "		
	6	10 July ...	12 "		
	7	10 " ...	19 "		
	8	10 " ...	...		Recovered
	9	...	Missing since 26 June	...	
	10	...	...	Never sick	Quite well

Particulars of the animal from which the above cattle were inoculated on arrival at Gracemere. Adult red tick-infested bullock brought from Boolburra on 25th March, and exposed at Gracemere, where it suffered an acute attack of tick fever as per following temperatures:—

	A.M.		A.M.
8 April ...	106·8	15 April ...	103·8
9 " ...	106·6	16 " ...	106·2
10 " ...	107·4	17 " ...	105·8
11 " ...	107·4	18 " ...	104
12 " ...	107·6	19 " ...	102·4
13 " ...	107·2	20 " ...	103·4
14 " ...	106·6	21 " ...	102

EXPERIMENT B.

To ascertain if it is possible to protect clean cattle against tick fever by dipping them in an arsenical dip immediately on arrival on virulently infested country, and at frequent intervals thereafter. The dip used contained arsenic, soda, and Stockholm tar—

Brought from St. Helens and Exposed at Gracemere.		First Showed Sickness.	Died On.	Never Showed Sickness.	Present Condition.
Dipped in Christian's dip on arrival (6 on 11th and 3 on 18th June), and once a week afterwards.	1	26 June ...	10 July		
	2	26 " ...	10 "		
	3	4 July ...	11 "		
	4	4 " ...	11 "		
	5	? " ...	11 "		
	6	? " ...	19 "		
	7	...	...	Found dead	Bogged*
	8	...	...	Never sick	Quite well
	9	? " ...	...	Never sick Still sick	Quite well Still sick

* The date and circumstances of the death of this animal suggest that it died of tick fever.

EXPERIMENT C.

To ascertain if it is possible to protect clean cattle against tick fever by administering large doses of quinine at regular intervals—

Brought from St. Helens and Exposed at Gracemere.	First Showed Sickness.		Died On.	Never Showed Sickness.	Present Condition.
Dosed with 249 grains of Quinine twice a week from date of arrival on 18th June	1	7 July ...	9 July		
	2	9 „ ...	10 „		
	3	9 „ ...	10 „		

Pisciculture.

THE *CERATODUS*.

It will be in the recollection of our readers that Mr. D. O'Connor, of Oxley—to whom we have been indebted, on different occasions, for interesting articles on Pisciculture—took from Queensland some live *Ceratodi*, which fish is only found in the Wide Bay waters—the Burnett and Mary Rivers. He was singularly fortunate in his experiment, as he landed the fish safely in London. Their arrival at once appealed to the London Zoological Society, which purchased two of them for £90; and Mr. O'Connor was offered £100 for the remaining two, if he would land them alive at the Jardin des Plantes in Paris. This the lucky pisciculturist will doubtless do.

A very remarkable coincidence happened in connection with the arrival in London of the *Ceratodi*. There is a fish which inhabits South American waters, much akin to the *Ceratodus*. Its scientific name is *Lepidosiren*, mention of which has been made in this *Journal*. A gentleman of zeal, equal to that of Mr. O'Connor, took home a living fish of this genus, and arrived in London simultaneously with the Queenslander and with a third traveller who came from Africa with stuffed specimens of new fish indigenous to Lake Tchad. So remarkable an incident was made the occasion of a special meeting of the Royal Society, at which meeting the three gentlemen were invited to address the members on the very important subject of these and other fishes of the three countries.

Mr. O'Connor has determined that on his return he will bring living Gourami from Java, or perhaps from the Mauritius, to Queensland, whose climate and waters are eminently suited to the habits of the fish. A description of the Gourami, with illustrations, will be found in Vol. I., Part IV., p. 340, of this *Journal*.

General Notes.

QUARANTINE FOR PLANTS.

ALLUDING to the steps taken to prevent the intrusion of the San José Scale, our contemporary, *Meehans' Monthly*, has the following wise remarks:—"But the truth is, the scale does not need looking after—not by law, for the scale will travel in spite of all law and its useless expenditures. Cultivators should be encouraged to look for and destroy the scale. It is as sensible to make laws that there should be quarantines against weeds as against insects. Like love, they laugh at ocksmiths."

HOW TO PLANT THE NUTS OF THE COCO-PALM.

A QUESTION has been raised in far Fiji as to the best mode of planting coconuts. Hitherto the recognised mode has been by laying the nuts on thier side or with the eye upwards; but an ex-Ceylon planter, Mr. Griffiths (?), has turned up in Fiji who declares that the proper way is with the eye down, and that the tree comes into bearing in half the time if the nuts are put in that way! We never heard of this practice, and should like to know what Messrs. W. H. Wright and W. Jardine have to say to it? We suspect they will agree with the experienced and shrewd coconut planter who writes:—"I always prefer laying the coconut on its side in the nursery, horizontally; and should say it is the best method for any district. The water in the nut keeps the eye moist, and facilitates the development of the germ; while if it is placed vertically, eye up, the eye dries and the germ may be sooner scorched in droughty weather. Besides, the nut may have to be planted out, too, erect, and then the base to resist wind, &c., is less. Eye down is a system I never heard of, and to which there are obvious objections. The shoot has an unnatural twist, is more liable to submersion (and rot) in wet weather, and to attacks of rats, white ants, and porcupines from immediate contact with the soil. I don't believe in it. I am quite content with the proportions of plants obtained by the horizontal system, which further follows nature. The dropped nut lies on its side."—*Tropical Agriculturist*, Colombo.

THE PADDY WEEVIL PEST.

WE are indebted to Mr. Vanderpoorten for a practical suggestion as to fighting the very serious attack of weevils on the paddy of the North-Western and Western provinces. In the case of Indian corn and wheat in America naphthaline is used, the smell of which is sufficient to keep away weevils without doing any harm to the corn. Mr. Vanderpoorten would recommend the use of a series of pieces of bamboo, say each 5 feet long, to correspond with the usual depth of heaps of paddy. Along the sides of these bamboos gimlet-holes should be bored—up even to an inch in diameter. Pinches of naphthaline should then be put inside the bamboos, which should be wrapped in a piece of clean cloth to prevent the rice getting into the bamboos. The naphthaline is so volatile that when the bamboos were stuck into the heaps of paddy, say at 5 feet apart, the smell would very speedily permeate the heap and drive away the weevils, or prevent paddy, as yet free, from being attacked. Mr. Vanderpoorten has already sent some naphthaline to the Kurunegala district to be experimented with, and it would be well if the Government agents and headmen and all intelligent natives, in the districts affected, at once gave a trial to this very simple and yet effective remedy. The cost is very little; a rupee's worth of naphthaline going a very long way indeed towards saving a large store of paddy.—*Tropical Agriculturist*, Colombo.

NECESSITY FOR FOREST CULTURE IN THE UNITED STATES.

(From *Engineering News*, 9th June, 1898.)

FOREST statistics for the United States, as presented by Mr. B. E. Fernow, chief of the Division of Forestry in the United States Department of Agriculture, show that our annual consumption of timber for industrial purposes is about 40 billion feet B.M. To meet this consumption there is (says Mr. Fernow) not more than 2,300 billion feet B.M. of standing timber, or less than sixty years' supply. This does not account for firewood or the timber burned in annual forest fires. Of the coniferous growth, the standing supply in the Eastern States will not last more than about sixteen years at the present rate of cut and waste (says the same authority); and the supply on the Pacific coast would not lengthen this period beyond thirty years. The demand is in excess of the supply, and the conditions call for a cessation of waste and the development of forest culture and general supervision.

A RECORD MILK YIELD.

PROFITABLE dairy farming consists not only in feeding, housing, and generally caring for the herd, but also in judiciously culling it. It does not pay to keep and feed a poor breed. All farmers will agree with this axiom, but many do not act up to it. The result is that these careless dairymen say that the business does not pay. If they would act like the Victorian farmer mentioned by the *Australasian* of 23rd July last, they might be equally successful. This gentleman pays especial attention to culling his herd, and he is credited with having secured a return of £9 15s. 4d. per cow for the milk disposed of at the factory, while, including the profit made from pigs fed on the return skim-milk, the amount per cow is brought up to £11 5s. 8d. Such an average, with a herd of say fifty milkers, should enable the farmer to maintain that the industry does pay. We have known dairymen in Queensland to milk 100 cows for a yield of 100-gallons, and think they were doing well. The four-quart cow ought not to exist in the present enlightened age, when experts are travelling over all parts of the colony lecturing and instructing the dairy farmers, and when grand dairy cattle can be seen and studied at most of the rural and city exhibitions.

BACON-CURING.

WE are indebted to an exchange for the following recipe for bacon-curing, which, at this season of the year, will no doubt be of interest to our agricultural readers. The process for real hand-curing is as follows:—When the meat is cold enough to cut up, take 1 lb. saltpetre (pulverise it thoroughly), 8 lb. best bay salt, $\frac{1}{2}$ lb. sal prunella, 1 lb. of best spice, and rub the rind of the hams, sides, and shoulders well with this mixture. Run a probe wire down the leg bone of the hams and shoulders, and pack the opening as soon as possible with the mixture. Sprinkle it on the flesh, and pile with rind down, repeating the operation every day. When they have drained for five days, in order to allow the blood to escape, they should be moistened daily with a solution of 8 lb. of sugar, 8 lb. of salt, 1 lb. of spice, and 2 quarts of strong vinegar. Should the usual reddish tint be not required, the saltpetre can be left out of the mixture after the fifth day, as it is more for colour than a preservative from this period to the end of the process. An ounce of best washing soda is now added to the first mixture to give that soft mellow bite so highly relished in a well-cured ham. The quantities given in both mixtures to be used are not for any certain weight of bacon, but merely to show the ratio of the mixture to be used during the process of curing. The bacon should be well rubbed on the rind and flesh every day for three weeks, and as much of the ingredients of the first mixture rubbed in as possible, and the pile changed every day. The top of the pile, whether it be hams, sides, or shoulders, must be put in the bottom, and *vice versa*. Each section should be kept separate. Care must be taken to keep the rind always down, and to sprinkle and moisten on the flesh side before the next layer is put on. At the end of the third week the rubbing and turning is done every second day for a fortnight; should the pigs be very large, every third day until the end of the progress, which ends in the eighth week. The salt should then be washed off the hams, sides, and shoulders, and then they should be hung up in a cool, draughty room for three weeks to dry. When thoroughly dry the bacon should be hung up in the smoking-room, where it should remain forty-eight hours for the object of smoking. A very close and perfectly air-tight room should be used for this purpose. Sawdust is far superior for the purpose than any other material. When thoroughly soaked, it should be removed from the smoke-room, and immersed in water at a temperature of 150 degrees for five minutes. The rind is then scraped with a knife as the sections are taken from the water, and the scraggy parts of the flesh neatly trimmed, the sides rolled, and the hams and shoulders shaped and neatly dressed with a very sharp knife. Some do this before smoking, but it will be found better to do it at this stage. The rind is at this stage well

rubbed with dry bran in order to give it that rich, glossy polish so pleasing to the eye and smooth to the feel. The hams and shoulders are now sewn in coarse canvas, and are then ready for market.—*Exchange*.

INDIGENOUS FRUITS.

ON the subject of indigenous fruits, Mr. Barclay Millar, of Herberton, writes:—

I am very much pleased to see the fruits of my early collections in your coloured illustration in the June number of the *Journal*. The pear is even more beautiful in its wild state. It is usually larger than the specimen shown, and in colour like lovely porcelain or white wax painted about two-thirds of its length, cool, pleasant-tasted, and refreshing. I have not at any time seen it on the Endeavour watershed, but on the Normanby, Laura, and towards the Morehead Rivers plentiful. I believe it is better known in Victoria now than it is in Queensland, as in its natal habitat no one resides. The late Mr. A. J. Hockings took much interest in the propagation of indigenous fruits, as did also his son, to whom I have invariably sent seeds of any found by me worthy of attention.

The *Davidsonia* is a lovely tree in its native state, very large and hardy. It will continue to shoot up in the main roadway. The men who make the roads don't know it, and down it goes. I think there are many of its class. I collected many about two years ago on the Russell, Mulgrave, and Johnstone Rivers, but lost all through insects. One not unlike the "Litchie" (Chinese Lie-chee). Another, rather a nice purple plum, of which I had eaten about twelve, when the blacks informed me it was poison. I, however, ate six more, with no bad consequences.

SUGAR FROM POTATOES.

EVEN as beet sugar has to a great extent replaced cane sugar, and turned the industry upside down in the process, so, it appears, may potato sugar eclipse beet sugar and again upset the tide. A Dutch correspondent writes to the *Westminster Gazette* that Dr. Geerlings, director of the proof station in Kagok-tegal (Java), formerly of the University of Amsterdam, and many years assistant in the chemical laboratory of that university, has discovered a simple method of converting the starch of potatoes into sugar. He has sent in a sealed envelope, as is customary, the descriptions of his method to the French Academie des Sciences; this to secure the priority of his invention, as his discovery is not yet quite at the stage of being made public. Dr. Prinzen Geerlings has so much official business upon his hands that some months may elapse before he can prepare the discovery for publication. Starch-producing plants are much less liable to climatic influences than sugar-producing vegetables, and with regard to the sugar industry the only question is to find the means for converting on a big scale and at small cost, so that the method may take the place of the manufacture of sugar from cane or beet. If this can be done there is one of the biggest economical revolutions in sight.

SUGAR FROM WATERMELONS.

DR. C. P. CARVER, of St. Augustine, Fla., is experimenting with the sugar-producing properties of watermelons. He has so far found that he can extract a fine taffy candy sugar at the proportion of 1 oz. to 8 oz. of the melon pulp without the rind. Dr. Carver is going to ascertain the proportion of saccharine matter in the whole watermelon, for he believes, from experiments he has made, that a large quantity can be extracted from the rind, as well as from the pulp or heart of the melon. He says he is positive a sugar of superior delicacy can be made from the melon.—*New York Shipping List*.

THERE is at the eastern base of the Alps (Sierra Nevada ?) much land subject to being destroyed by deep washing of sand, on which nothing will grow except melons, only two being allowed to mature on a single vine. As the melons are gathered they are slashed open with a big knife, and a wooden scoop empties the pulp into a vessel, where the juice is expressed like maple sugar in the Atlantic States. The sugar sells at remunerative prices, is light-coloured and sweet. Red-pulp melons give a dark sugar; white pulp is therefore preferred. We have in this State a great area of land similarly destroyed every year. This sugar-melon example is commended to poor men, who can get the free use of the space and proceed on small capital.—*Florida Farmer*.

EARTHWORMS AND VEGETATION.

PROFESSOR WOLLNY has conducted some experiments to ascertain what was the influence earthworms had on vegetation. He found that their presence was extremely favourable, the produce of the several plants below being increased as follows:—Peas gave 25 per cent. more fruit, 35 per cent. more stalks, &c.; beans gave 69 per cent. more peas in the pod, and 47 per cent. more stalks, &c.; while potatoes yielded 136 per cent. more. This favourable effect, says Professor Wollny, is probably due to the ventilation of the earth by the holes dug by worms.

IMPORTS AND EXPORTS OF DAIRY PRODUCE.

THE following statistics in connection with the dairying industry show what rapid strides it is now making in Australia. In 1889 there were imported into Queensland 781,442 lb. butter, valued at £35,041; and 1,274,310 lb. cheese, valued at £31,853. In 1894 we imported 221,724 lb. butter, valued at £9,485; and 65,720 lb. cheese, valued at £1,543. In November last, Queensland exported 81 tons 13 cwt. 28 lb. of butter. Victoria in that year had 200 butter factories and as many creameries. The returns from dairying in Victoria have risen in value from almost nothing, at the beginning of the present decade, to upwards of £1,000,000. In 1895-96 the quantity exported was 7,733 tons. This season upwards of 7,895 tons have been exported to England, and 2,000 tons to Western Australia. The value of the butter sent to England was £736,913; and of that to Western Australia £205,333. Good cows are not yet the rule in Victoria, but the farmers feed them in winter and make the most of them. Stimulated by the example of Victoria, the farmers of New South Wales have been making the dairy industry go ahead by leaps and bounds. The milk yield of the colony last year is reported to have been 108,050,000 gallons, of which 74,111,100 gallons were consumed in making 25,874,277 lb. of butter and 4,049,844 lb. of cheese. Dairying is rapidly taking the place of sugar-cane growing on the Northern rivers. The dairy cattle of the colony are valued at £2,200,000.—*Bundaberg Mail*.

EGGS AS FOOD.

WOULD it not be wise to substitute more eggs for meat in our daily diet? About one-third of an egg is solid nutriment. This is more than can be said of meat. There are no bones, no tough pieces that have to be laid aside. A good egg is made up of 10 parts shell, 60 parts white, and 30 parts yolk. The white of an egg contains 66 per cent. water and the yolk 52 per cent. Practically, an egg is animal food, and yet there is none of the disagreeable work of the butcher necessary to obtain it. The vegetarians of England use eggs freely (says the *Family Doctor*), and many of these men are eighty and ninety years old, and have been remarkably free from sickness. Eggs are best when cooked four minutes; this takes away the animal taste which is offensive to some, but does not harden the white or yolk so as to make them difficult to digest. An egg if cooked very hard is difficult of digestion, except by those persons possessed of stout stomachs. Such eggs should be eaten with bread

and masticated very finely. An egg spread on toast is fit for a king—if kings deserve better food than anybody else. Fried eggs are much less wholesome than boiled ones. An egg dropped into hot water is not only a clean and handsome but a delicious morsel. Most people spoil the taste of their eggs by adding pepper and salt. A little sweet butter is the best dressing. Eggs contain much phosphorus, which is supposed to be beneficial to those who use their brains much.—*Bundaberg Mail*.

AGE OF MANDARIN ORANGE-TREES.

SOME time ago we were requested by a correspondent to give the age of the oldest Mandarin trees in Queensland. After considerable inquiry we discovered trees in the Rockhampton and Maryborough districts of respectable old age, still in vigorous health and bearing heavily. But, irrespective of individual trees, including some we ourselves planted thirty years ago in the Oxley district, we are inclined to give the palm for comparatively hoary old age to trees now thriving in Mr. Parker's orchard, at Glen Retreat, in the Enoggera district. Here there are Emperor Mandarins, forty years old, bearing heavily, and showing no sign of "die back." The Scarlet Emperors on this property, planted thirty-five years ago, are magnificent trees, spreading over 40 feet, with a stem diameter of 15 inches. The soil is a sandy, scrub loam, and very little manure has ever been applied to it. The Emperors first mentioned as being forty years old have a stem circumference of 3 feet 2 inches just below the first branches, the branches spread to a diameter of 25 feet, and at the time of our visit were loaded with excellent fruit. The orchard is situated in a fertile valley—we might even call it a wide gully—at the base of two ranges of high hills, and is well sheltered from high winds.

There is one variety of orange grown here which we have not seen elsewhere in perfection. It is called the "Beauty of Glen Retreat." This mandarin is one of the most perfect oranges of its kind we have ever seen. It is of medium size with a perfectly smooth skin, scarcely thicker than parchment. Indeed, when held up to a strong light, the skin is quite transparent. The orange has an excellent flavour and is very juicy, with less fibre than any other mandarin.

Lately at some of the shows, notably at Maryborough and at Gatton, exhibits have been made of Glen Retreats, which have been disqualified by the judges as being either sports from the original or a "throw back." Mr. Benson had an excellent opportunity at Maryborough of proving the correctness of his judgment, as he was able to produce the true Glen Retreat, and on comparison with the rougher exhibit the difference was plainly seen. At the Gatton Show the same thing occurred. Messrs. Boyd and Gorrie, when judging the oranges, threw out an exhibit marked Glen Retreat, and were able to emphatically sustain their judgment.

Mr. Parker is careful to maintain this variety in its purity, and has been most successful in doing so. Orange-growers could not do better than pay a visit to this orchard, and they would then easily perceive the difference between the true "Glen" and the sport.

TO GERMINATE MUSK SEED.

MR. S. EAVES recommends the following method of germinating musk seed:—Take a flower-pot; place in the bottom the usual crocks and charcoal, fill up to within an inch of the top with good potting soil and dry manure, which must be very fine; then thoroughly water before sowing the seed. After scattering the seed on the surface, cover lightly with very fine potting soil; place a piece of glass over the pot; keep it in the shade, or where at most it will get the morning sun. When the plants are up, raise the glass a little by placing a piece of stick under it on the edge of the pot, and when they are half-an-inch high remove the glass altogether.

JERUSALEM WHEAT.

THE Department of Agriculture is not aware of any such variety. Jerusalem Corn has been distributed to the following persons during 1893:—

E. Sainsbury, Redland Bay road, Brisbane; J. Storey, Park Ridge, Waterford, Logan district; W. B. Armstrong, Swan Creek, Warwick; D. Cumming, Pittsworth, Toowoomba; W. R. Twine, Wallumbilla—from whom, perhaps, some might be obtained. The corn has been well reported on.

NOOGOORA BURR.

AT the Agricultural and Pastoral Conference recently held at Rockhampton, Mr. Macfarlane is reported (*vide the Agricultural Journal* for August, 1898, page 131) to have expressed regret that there was no one, at the time of the first appearance of the Noogoora Burr, to identify such plants. It possibly escaped Mr. Macfarlane's memory that over twenty years ago Mr. F. M. Bailey, who was at that time Botanist to the Board of Inquiry into the Diseases affecting Live Stock and Plants, received a specimen of the above-mentioned plant from Mr. P. R. Gordon, the Chief Inspector of Stock, at about 11 o'clock one day, and gave him the name and account of the plant at about 3 o'clock the same day. Soon after this the late Dr. Joseph Bancroft wrote one or more papers on the subject of the poisonous properties of the plant. Surely some of those at the meeting might have been able to draw Mr. Macfarlane's attention to these facts.

LANTANA.

MR. H. E. WYMAN, who read a paper on noxious weeds at the above-mentioned Conference, in referring to Lantana, was evidently unaware that this is a generic name, and contains forty or fifty species, several of which are highly ornamental and not likely, if introduced into the colony for garden culture, to become pests, and it is probable that what Mr. Wyman saw catalogued at 3s. 6d. per plant was one of these. One surely would not prohibit the introduction of the many varieties of French and African marigolds, which belong to the genus *Tugetes*, because "Stinking Rodger," the too well-known pest, belongs to the same genus. The Lantana referred to in Mr. Wyman's paper is *L. camara*; this certainly is destructive to the pasture if allowed to spread; but there are two other species—viz., *L. Sellowiana* and *L. crocea*—which have strayed from our gardens, but, although they have been in the colony an equal time with *L. camara*, are even now only met with in a few isolated places, and neither can be called a noxious weed.—Ed. *Q.A.J.*

STRAWBERRY WINE.

WHILST many fruits other than grapes have been used for making wine, we have not yet heard of the strawberry being so utilised. Apples, pears, currants, pineapples, elder-berries, and many other fruits are utilised for making wine, cider, and perry. Red currant wine is a very refreshing drink in summer time, provided it is not kept as long as the currant wine so hospitably dispensed by the late lamented Mr. Pecksniff. Pineapple wine and orange wine are both pleasant beverages. It remains to be seen if strawberry wine can be produced economically, for, of course, it can be made. We find a recipe for making it in the *Rural New Yorker*, which is as follows:—

To make strawberry wine, the fresh, ripe fruit is crushed, put into an earthen jar, and covered with cold water. This starts fermentation. After two or three days, press out the juice, and add two pounds granulated sugar to each gallon of the liquid. Run the material into casks placed in the cellar, and allow it to ferment with open bungs for several months. When this is finished, strain and bottle. This should make a clear first-quality wine, which will keep indefinitely.

STRAWBERRY CIDER.—A fair cider may be made by simply crushing out the juice and allowing it to ferment in an open cask without the addition of sugar. By leaving this in a warm place for several months, it becomes sufficiently acidified to pass for vinegar. A better grade of strawberry vinegar may be made by adding to each gallon of the fruit-juice about a pound of brown sugar, and following the same methods as in making cider vinegar.

A SUMMER DRINK.—An excellent summer drink may be made from strawberries in this way:—Soak two quarts of whole fruit in vinegar for two days, then pour off the liquid over two quarts of fresh fruit, and allow it to stand as before; repeat a third time, and strain. To each pint of the liquid add one pound of granulated sugar, boil slowly for five minutes, skim, cool for a quarter of an hour, bottle, and seal. One or two teaspoonfuls of this in a glass of sweetened water gives inward satisfaction. These suggestions are applicable to other small fruits, with minor adaptations for special purposes.

Our strawberry-growers always have a quantity of small, badly-shaped fruit which goes into the pulp-cask for the jam factories. Why not try one or two of these suggestions? Why always wait for an idea from America? Is it that we are too conservative, or too careless, or too non-progressive?

The strawberry season is now upon us, and ample opportunity will be afforded for experiments on a small scale. An exhibit at one of our shows, six or eight months hence, of strawberry wine, cider, vinegar, and sweet beverages would be interesting, and might be productive of trade in a new by-product.

AGRICULTURAL AND HORTICULTURAL SHOWS.

THE Editor will be glad if the secretaries of Agricultural and other Societies will, as early as possible after the fixture of their respective shows, notify him of the date, and also of any change in date which may have been decided on.

LIST OF AGRICULTURAL, HORTICULTURAL, AND PASTORAL
SOCIETIES AND ASSOCIATIONS IN QUEENSLAND.

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Allora ...	Central Downs Agricultural and Horticultural Association	J. H. Buxton...	
Beaudesert ...	Logan and Albert Pastoral and Agricultural Society	M. Hinchcliffe ...	6 May
Beenleigh ...	Agricultural and Pastoral Society of Southern Queensland	Wilson Holliday ...	30 Sept.
Birthamba ...	South Kolan Agricultural and General Progress Association	G. W. Nixon ...	
Blackall ...	Barcoo Pastoral Society ...	F. Clewett ...	
Boonah ...	Fassifern and Dugandan Agricultural and Pastoral Association	J. A. McBean ...	28 April
Booyal Scrub	Booyal Progress Association ...	H. Masson ...	
Bowen ...	Bowen Farmers' Club ...	J. B. Thuman ...	
Bowen ...	Pastoral, Agricultural, and Mining Society ...	J. E. Smith ...	8 June
Bowen ...	Preston Farmers' Association ...	R. A. Foulger ...	
Bowen ...	Proserpine Farmers' and Settlers' Association	G. W. Pott ...	
Brisbane ...	Horticultural Society of Queensland ..	G. K. Seabrook ...	21 and 22 April and 10 Oct.
Brisbane ...	Moreton Agricultural, Horticultural, and Industrial Association	J. Duffield ...	
Brisbane ...	Queensland Acclimatisation Society ...	E. Grimley ...	
Brisbane ...	Queensland Fruit and Economic Plant Growers' Association	G. K. Seabrook ...	
Brisbane ...	National Agricultural and Industrial Association of Queensland	H. C. Wood ...	10, 11, and 12 Aug.
Brisbane ...	Queensland Stockbreeders' and Graziers' Association	F. A. Blackman ...	
Brisbane ...	United Pastoralists' Association ...	Fredk. Ranson ...	
Bundaberg ...	Bundaberg Agricultural and Pastoral Society	A. McIntosh...	
Bundaberg ...	Bundaberg Horticultural and Industrial Society	H. E. Ashley...	29 Sept.
Bundaberg ...	Woongarra Canegrowers' and Farmers' Association	H. Cattermull ...	
Burpengary...	Burpengary Farmers' Association ...	C. H. Ham ...	
Caboolture ...	Caboolture Farmers' Association ...	G. Mallet ...	
Cairns ...	Barron Valley Farmers' and Progress Association	W. F. Logan...	
Cairns ...	Cairns Agricultural, Pastoral, and Mining Association	A. J. Draper ...	
Cairns ...	Hambleton Planters' Association ...	E. Whitehouse ...	
Charleville ..	Central Warrego Pastoral and Agricultural Association	A. J. Carter ...	25 and 26 May
Charters Towers	Towers Pastoral, Agricultural, and Mining Association	W. Tilley ...	
Childers ...	Isis Agricultural Association ...	H. Epps ...	
Childers ...	Childers Progress Branch, Isis Agricultural Association	N. Rosenlund ...	
Childers ...	Doolbi Mill Branch, Isis Agricultural Association	W. T. H. Job ...	
Childers ...	Childers Mill Branch, Isis Agricultural Association	H. Epps ...	
Clermont ...	Peak Downs Pastoral, Horticultural, and Agricultural Society	F. Leysley ...	
Clermont ...	Peak Downs Dairymen and Settlers' Association	A. G. Pursell ...	
Cooktown ...	Cook District Pastoral and Agricultural Society	W. R. Humphreys ...	
Cordalba ...	Cordalba Farmers' Association ...	B. Goodliffe ...	
Currajong ...	Currajong Farmers' Progress Association ...	Wm. Howard ...	
Cunnamulla ...	South Warrego Pastoral Association ...	J. Winward ...	
Gayndah ...	Gayndah Agricultural and Horticultural Association	J. C. Kerr ...	
Gin Gin ...	Pastoral and Agricultural Society of Gin Gin	E. K. Wollen ...	
Gladstone ...	Gladstone Pastoral and Agricultural Association	W. J. Manning ...	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Gooburrum, Bundaberg Goondiwindi	Gooburrum Farmers' and Canegrowers' Association MacIntyre River Pastoral and Agricultural Society	W. J. Tutin ... A. Gough ...	14 and 15 Sept.
Gympie ...	Agricultural, Mining, and Pastoral Society	F. Vaughan ...	
Gympie ...	Gympie Horticultural Society ...	W. G. Ambrose ...	
Helidon ...	Helidon Scrub Farmers' Progress Association	M. Morgan ...	
Herbert River	Halifax Planters' Club ...	H. G. Faithful ...	11 and 12 April
Herbert River	Macnade Farmers' Association...	E. C. Biggs ...	
Herbert River	Ripple Creek Farmers' Association ...	J. W. Grimes ...	
Herberton ...	Mining, Pastoral, and Agricultural Association	John M. Hollway ...	
Hughenden...	Hughenden Pastoral and Agricultural Association	W. H. Mulligan ...	10 and 11 May
Ingham ...	Herbert River Farmers' Association ...	P. S. Cochrane ...	3 Sept.
Ingham ...	Herbert River Pastoral and Agricultural Association		
Ipswich ...	Ipswich and West Moreton Agricultural and Horticultural Society	P. W. Cameron ...	6 Oct.
Ipswich ...	Queensland Pastoral and Agricultural Society	Elias Harding ...	1 and 2 June
Kalkie ... (Bundaberg)	Woongarra Canegrowers' and Farmers' Association	O. H. A. Kraak ...	
Kandanga (near Gympie)	Kandanga Farmers' Association ...	N. Rasmussen ...	
Kolan ...	Kolan Canegrowers' and Farmers' Association	C. Marks ...	
Laidley ...	Lockyer Agricultural and Industrial Society	John Fielding ...	27 and 28 July
Loganholme...	Logan Farming and Industrial Association ...	F. W. Peek ...	12 April
Longreach ...	Longreach Pastoral and Agricultural Society	J. P. Peterson ...	
Lucinda Point	Victoria Farmers' Association ...	W. S. C. Warren ...	
Mackay ...	Agricultural, Pastoral, and Mining Association	F. Black ...	27, 28, and 29 July
Mackay ...	Pioneer River Farmers' Association ..	E. Swayne ...	
Maryborough	Maryborough Horticultural Society ...	H. A. Jones ...	
Maryborough	Wide Bay and Burnett Pastoral and Agricultural Society	G. Willey ...	
Milbong ...	Milbong Farmers' Association ...	T. R. Garrick ...	
Mitchell ...	Mitchell and Maranoa Pastoral, Agricultural, and Vinegrowers' Association	H. J. Corbett ...	
Mosman River	Mosman River Farmers' Association ...	R. Thomas ...	
Mount Mee...	Mount Mee Farmers' Association ...		
Mount Morgan	Mount Morgan Mining, Agricultural, Poultry, Pastoral, and Horticultural Society	G. Orford ...	
Mulgrave ..	Mulgrave River Farmers' Association ...	Thos. Swan ...	
Nerang ...	South Queensland and Border Pastoral and Agricultural Society	W. J. Browne ...	
North Isis ...	North Isis Canegrowers' Association ...	W. J. Young ...	
Pialba ...	Pialba Farmers' Association ...	J. B. Stephens ...	
Pinbarren ...	Pinbarren Agricultural and Progress Association	H. Armitage, senr. ...	
Rockhampton	Central Queensland Farmers' and Selectors' Association	T. Whitely, Coowonga	10 and 11 May
Rockhampton	Central Queensland Pastoral Employers' Association	G. Mackay ...	
Rockhampton	Central Queensland Stockowners' Association	R. R. Dawbarn ...	
Rockhampton	Rockhampton Agricultural Society ...	R. R. Dawbarn ...	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Roma ...	Western Queensland Pastoral and Agricultural Association	H. K. Alford ...	10 and 11 May
Roma ...	Yingerbay Farmers' Association ...	F. E. Glazier... ..	
Rosewood ..	Farmers' Club	P. H. Adams... ..	25 Aug.
Springsure ...	Queensland Pastoral Society	G. R. Milliken ...	
Stanthorpe ...	Border Agricultural, Pastoral, and Mining Society	Geo. Simcocks ...	
Stanthorpe ...	Stanthorpe Horticultural and Viticultural Society	R. Hoggan	
St. George ...	Balonne Pastoral and Agricultural Association	T. M. Cummings ...	
Toowoomba	Darling Downs Horticultural Association ...	H. Hopkins	
Toowoomba	Drayton and Toowoomba Agricultural and Horticultural Society	H. Symes	
Toowoomba	Royal Agricultural Society of Queensland ...	F. Burt	2, 3, and 4 Aug.
Townsville ...	Townsville Pastoral, Agricultural, and Industrial Association (formerly North Queensland Pastoral and Agricultural Association)	J. N. Parkes	
Wallumbilla	Wallumbilla Farmers' Association	P. W. Howse	
Warwick ...	Eastern Downs Horticultural and Agricultural Association	J. Selke	
Wellington Point	Wellington Point Agricultural, Horticultural, and Industrial Association	J. B. Blaine	6 Aug.
Woombye ...	Woombye Fruitgrowers' Association	P. S. Hungerford ...	
Woowoonga	Degilbo Progress Association	F. A. Griffiths ...	
Woowoonga	Woowoonga Scrub Farmers' Association ...	H. B. Griffiths ...	

The Markets.

AVERAGE PRICES FOR JULY.

Article.								JULY.		
								Top Prices.		
								£	s.	d.
Bacon	...	...	...	...	...	...	lb.	0	0	6 $\frac{1}{2}$
Bran	...	...	...	...	...	...	ton	3	9	0
Butter, First	...	...	...	...	...	...	lb.	0	1	1 $\frac{1}{10}$
Butter, Second	...	...	...	...	...	...	"	0	0	7 $\frac{1}{2}$
Chaff, Mixed	...	...	...	...	...	...	ton	3	14	6
Chaff, Oaten	...	...	...	...	...	...	"	4	5	0
Chaff, Lucerne	...	...	...	...	...	...	"	3	11	0
Chaff, Wheaten	...	...	...	...	...	...	"	2	11	0
Cheese	...	...	...	...	...	...	lb.	0	0	6 $\frac{1}{4}$
Flour	...	...	...	...	...	...	ton	13	5	0
Hay, Oaten	...	...	...	...	...	...	"	3	9	0
Hay, Lucerne	...	...	...	...	...	...	"	2	16	6
Honey	...	...	...	...	...	...	lb.	0	0	2
Japan Rice, Bond	...	...	...	...	...	...	ton	19	0	0
Maize	...	...	...	...	...	...	bush.	0	3	1 $\frac{7}{10}$
Oats	...	...	...	...	...	...	"	0	3	6
Pollard	...	...	...	...	...	...	ton	4	11	0
Potatoes	...	...	...	...	...	...	"	9	10	0
Potatoes, Sweet	...	...	...	...	...	...	"	2	5	0
Pumpkins, Table	...	...	...	...	...	...	"	1	7	0
Sugar, White	...	...	...	...	...	...	"	14	8	0
Sugar, Yellow	...	...	...	...	...	...	"	12	10	0
Sugar, Ration	...	...	...	...	...	...	"	11	10	0
Wheat	...	...	...	...	...	...	bush.	0	4	8 $\frac{2}{5}$
Onions	...	...	...	...	...	...	cwt.	0	14	6
Hams	...	...	...	...	...	...	lb.	0	0	9
Eggs	...	...	...	...	...	...	doz.	0	0	9 $\frac{1}{5}$
Fowls	...	...	...	...	...	...	pair	0	3	7 $\frac{1}{5}$
Geese	...	...	...	...	...	...	"	0	5	6 $\frac{3}{5}$
Ducks, English	...	...	...	...	...	...	"	0	2	11 $\frac{2}{5}$
Ducks, Muscovy	...	...	...	...	...	...	"	0	3	8 $\frac{2}{5}$
Turkeys, Hens	...	...	...	...	...	...	"	0	6	2 $\frac{2}{5}$
Turkeys, Gobblers	...	...	...	...	...	...	"	0	12	1 $\frac{1}{5}$

ENOGGERA SALES.

Article.								JULY.		
								Top Prices.		
								£	s.	d.
Bullocks	...	...	...	...	...	...	...	4	16	1 $\frac{1}{5}$
Cows	...	...	...	...	...	...	...	2	18	0
Wethers, Merino	...	...	...	...	...	...	...	0	13	3
Ewes, Merino	...	...	...	...	...	...	...	0	8	2 $\frac{2}{5}$
Wethers, C.B.	...	...	...	...	...	...	...	0	13	6
Ewes, C.B.	...	...	...	...	...	...	...	0	12	5
Lambs	...	...	...	...	...	...	...	0	11	4 $\frac{4}{5}$
Baconers	...	...	...	...	...	...	...	1	14	6
Porkers	...	...	...	...	...	...	...	1	5	1 $\frac{1}{5}$
Slips	...	...	...	...	...	...	...	0	13	0

Orchard Notes for September.

BY A. H. BENSON.

THE planting and pruning of all deciduous trees should have been completed even in the coldest districts by the end of August, and during the present month the orchardist should disbud and thumb-prune the young trees as soon as they start out into growth. Judicious thumb-pruning is necessary in order to reduce the number of branches, only those buds being allowed to develop into branches that will be required to form the future head of the tree, all the rest being either removed or, better still, pinched back and converted into spurs which will eventually bear fruit and which, meanwhile, will produce a tuft of leaves that will tend to strengthen the branch and to protect it from sunburn. Spraying should be continued during the month in the case of deciduous trees attacked by fungus diseases, such as the shot-hole fungus or rust of the apricot and the Windsor pear blight of pears, the material used being Bordeaux Mixture. Where leaf-eating insects of any kind are troublesome, a little Paris green—1 oz. to 10 gallons—should be added to the Bordeaux Mixture, the spraying material being then both an insecticide and fungicide, and two pests are destroyed by the one spraying. Vines that have not been treated for black spot as described in the Orchard Notes for August, should be treated at once; and vine-planting should be done during the beginning of the month, though if the cuttings have been kept in a cold place planting can be continued all through the month. In planting grape-cuttings, see that the cutting is always planted firmly, and that the soil comes into direct touch with it all round, as, if not, it is very apt to dry out. Plant the cutting with the top eye just on a level with, or rather slightly below, the surface of the ground, not with 6 inches or more of the cutting sticking out of the ground, as the nearer to the ground the main stem of the vine starts the better the vine will be, and the easier will be its subsequent training.

Orange-trees will be in full blossom during the month, and in the earlier districts the young fruit will probably be ready to treat for Maori or rust towards the end of the month. Maori is caused by a very small mite, which begins its attack on the young fruit when it is about the size of a marble, though the injury it causes is seldom noticeable till the fruit begins to ripen. Spraying the trees with a mixture of sulphur and soft soap, or with a weak solution of sulphide of soda, or dusting the trees with fine sulphur will destroy these mites. During the end of the month pineapple and banana suckers may be set out during favourable weather in the earlier districts, but it is not advisable to plant out too early, as they do not root readily till the soil is thoroughly well warmed. Orchards and vineyards should be kept well cultivated during the month, as if there is a dry spring the success of the crop will depend very much on the manner in which the orchard is kept, as the better the orchard is cultivated the longer it will retain the moisture required by the trees for the proper development of their fruit. Quickly acting manures, such as sulphate of potash, sulphate of ammonia, and superphosphate, can be applied to fruit trees during the month if there is any suitable showery weather, but should not be applied during either a very dry or very wet spell. Fruit trees should be mulched, and when cow-peas are required for mulching they can be planted towards the end of the month.

During the month a careful examination should be made of all fruit to see if any contains larvæ of fruit fly; and if such are found, they should be destroyed, as if extreme care is taken during this and the two following months to destroy the larvæ of all fruit flies, whenever and wherever found, this great curse of the fruitgrower would be greatly reduced, as it is on the careful destruction of the earlier broods of flies that the saving of the main crop of

fruit will principally depend. Though the first damage caused by the flies is comparatively insignificant, they reproduce themselves so rapidly that a few mature insects in the beginning of the season become many thousands before it closes.

Farm and Garden Notes for September.

Farm.—Growing crops should be kept clean, and those requiring earthing-up should be attended to. A vigorous use of the hoe, horse or hand, will tend to save future labour. Sow maize, sorghum, imphee, prairie-grass, panicum, tobacco, and pumpkins. Plant potatoes, and earth-up those already growing. Sweet potatoes may be planted if the cuttings can be obtained. Cane-planting should now be carried on vigorously. Plant out coffee, ginger, arrowroot, and yams.

Kitchen Garden.—All the attention now bestowed upon it will be well repaid. This is the month for general sowings of most kinds of vegetables. Plant out rhubarb, Jerusalem artichokes, seakale, and asparagus. Transplant cabbages, cauliflowers, eschalots, &c., for a succession. Melons, cucumbers, vegetable marrows, custard marrows, tomatoes, and egg-plants may all be sown. Rosellas should also be sown in sheltered spots. Keep the crops clean, and manure with liquid manure. It is a good thing to sow newly dug beds with salt. The action of salt on the soil is not understood, but applied as a top-dressing it appears to check a tendency to rank growth. Cabbage especially is benefited by salt, but used too liberally it leads to the formation of a pan, and renders soils sterile.

Flower Garden.—Continue to plant bulbs as directed last month. Protect the plants as much as possible from cold westerly winds, which may still occur. Keep a good lookout for slugs, which should be destroyed whenever detected. Toads are very useful helpers in the garden and bush-house, and should be encouraged to take up their quarters there. They are perfectly harmless in spite of their ugliness. Fill up all the vacancies with herbaceous plants. Sow zinnia, gaillardia, amaranthus, coxcomb, balsam, sunflower, marigold, cosmea, summer chrysanthemum, coreopsis, portulacca, mesembryanthemum, calendula, &c. Plant out bulbs, as dahlias, gladiolus, amaryllis, tuberoses, ismene, crinum, pancratiums, &c.; also cannas.

Cultural Notes for Tropical Queensland.

[The Cultural Notes for Tropical Queensland, kindly supplied by Mr. E. Cowley, Kamerunga State Nursery, are given a month in advance, for the obvious reason that the *Journal* cannot reach some parts of the far North until the month of issue is well-nigh over, and hence the monthly notes would be valueless until the following year.]

OCTOBER.

Agave rigida, var. *sisalana*, suckers may now be planted out. Young coffee plants should be attended to in the nursery. Keep coffee plantation clean. In some seasons coffee-trees will bloom during this month. A small picking of Liberian coffee may be made. It is not wise to plant coffee seed now, picked in the earlier months of the year, germination being doubtful. Plantings of bananas may be commenced in newly burnt off scrub land. Sugar-cane crushing is continued, and field operations will be the same as for last month.

The Queensland Agricultural College.

THE winter being now fairly over, sowing and planting operations at the College are being vigorously carried on. The persistent dry weather, to some extent, hampers the work; but, on the other hand, ploughing has had the opportunity of being vigorously pushed on. Several acres of potatoes have been planted, and the earliest sown are well over ground, with very few misses apparent. There is an object lesson to be learnt in this connection.

The Principal, Mr. John Mahon, has made an early and successful start with a large plot of experimental grasses. About 150 varieties of grasses, clovers, &c., have been sown, some in drills and some broadcast. Many of these are already showing up well. Of maize, a number of valuable new varieties have been sown on an experimental plot, and are now growing vigorously. Amongst these experiment grasses, maize, &c., are—White and Red Clover, New Zealand Rye Grass, Prairie Grass, Giant Italian Rye Grass, Texas Blue Grass, *Paspalum dilatatum*. Clovers: Dutch, Alsike, Hop, and Cow Grass; Rape, Cocksfoot, Creeping Bent Grass, Meadow Foxtail. The maize plots consist of Golden King, Paterson's Variety, Bristol Early Yellow, Pennsylvania Long Yellow Dent, Golden Dent, Maryland White Dent, White Horse Tooth, and Old Cabin Home; Southern White Gourd seed, Old Man Saltbush, Real Saltbush, Creeping Saltbush, and Saltbush from Lake Dunne, near Jericho. None of these varieties will be available for distribution at harvest time, as only a limited quantity of each has been sown in order to test their value. The results will, of course, be published, and the advice and assistance of the Department of Agriculture will be given to all who wish to sow any of the seeds which have proved themselves of value. The experimental wheats were slightly affected by rust, but the disease makes no headway, and the ears are well formed and rapidly swelling. As an experiment, a plot of about four acres of wheat and oats have been sown, which will come in handy for the silo, if it proves a failure as to grain. Land is being got ready as quickly as possible for maize, cow-pea, mangold-wurtzel, and horse carrots. Should a few genial showers soon fall, the whole of the land under cultivation will be planted, and the breaking up of another fifty-acre paddock will be commenced.

The grass paddocks, which, up to a few weeks ago, presented the appearance of a yellow sea of long dry grass, were burnt off before the last rains in August, and now present a beautiful stretch of young green grass. There is every appearance of abundance of feed for the stock.

THE GARDEN.

Under the skilful management of the horticulturist, Mr. Gorrie, the vegetable and fruit garden, vineyard and orchard, make a very fine show. The whole of this portion of the College Farm (15 acres) is as neatly cultivated as a small garden patch, neither weeds nor unsightly worn-out beds of old produce being visible. Here, as on the farm, operations have been hampered

by want of water, owing mainly to the alterations being made in the system of reticulation, which has for a time put a stop to irrigation. Still, there is always an abundance of vegetables for all College purposes and also for sale. It is a remarkable fact that the superabundance of vegetables, especially of swedes, carrots, and rhubarb, is sold to be retailed by dealers mainly to farmers between Gatton and Helidon. Experiments are being made with thirty different varieties of lettuce, which will be fully reported on in due time, as will the results of experiments which are still being conducted with new varieties of potatoes. There is a good crop of onions of various kinds, as well as of swedes, asparagus, rhubarb, cabbage, beans, and general garden produce. The leaf artichoke appears to thrive admirably here. This vegetable, so universally esteemed in France amongst all classes, should take its place among the real table delicacies. The strawberry crop is, owing to the dry season, several weeks later than usual, but the crop, which is now being gathered, will be a heavy one and the fruit of good quality.

A plot of velvet bean from seed saved from last season has been sown to test the value of the bean as a green manure; other plants will be grown on trellises for the purpose of obtaining seed for next season.

Tobacco is being experimented on under the supervision of Mr. R. Nevill, Tobacco Expert. Four seed beds were carefully prepared by heavy burning, and on these, two varieties of imported seed were sown. One variety, "Yellow Pryor," will be grown on the poor sandy soil near the College buildings, and the second, "W. Burley," on the rich alluvial soil on the bank of Lockyer Creek. The seed in the two first beds has germinated well, and the young seedlings are growing rapidly.

The orchard trees have quite recovered from the severe pruning and dressing they received in July owing to the presence of the San José Scale, and are now growing vigorously. A strong permanent trellis for the vines has been erected. The latter are bursting into vigorous growth.

In the orchard there are a limited number of suckers of the Adriatic Fig. Three plants of the wild Capri Fig were planted, but only one will probably survive, as they were received in an almost dead condition. Amongst other trees are Japanese plums, peaches, persimmons, quinces, nectarines, apricots, mandarins, mulberries, and, in fact, all kinds of trees suitable to the climate. The object of planting many of these trees is to afford instruction in the treatment of as many varieties of trees as can be grown in the district.

The irrigation of the garden and orchard was carried on by the help of a temporary irrigation scheme initiated some time ago. This is now being replaced by a thoroughly efficient system of reticulation with conduit pipes of increased diameter and greater boiler power at the creek. The scheme provides for a water supply not only for the gardens, but also for the experimental plots on the farm, and for the College buildings and gardens. The latter, which surround the buildings, are now bursting out into full beauty of bloom of creepers and shrubs. Many more shrubs, trees, and flowers have been lately planted, and an avenue half-a-mile long, between the creek and the Tarampa road (which intersects the College farm), has been planted on both sides with several varieties of pine-trees.

BUILDINGS.

The original buildings, having already been described in the *Journal*, need not be again mentioned here. But further additions will shortly be made in the shape of extensive cow-sheds, stables, piggeries, poultry-yard, a house on the garden site for the Horticulturist, a gymnasium and lecture-hall (which is badly needed), additions to the mens' quarters, &c.

A blacksmith's shop has just been completed, and instruction is given to the students in the various operations carried on by the foreman smith in iron-working, as applied to farm implements, wagons, horses, repairs, &c.

One long-needed improvement is being effected and is nearing completion ; and that is, a straight road from the College railway siding to the buildings. The distance is about three-quarters of a mile, and up to the present the winding track has led over flat, melon-hole black soil difficult to negotiate in wet weather. The new road, being elevated, formed, and of good width, will afford more easy and certainly drier travelling during wet and dry weather.

A number of trees are being removed on the hill and flat facing the station to afford a view of the College from certain points of the railway line.

DAIRY AND DAIRY HERD.

Special attention and care are devoted to recording the quantity (measure and weight) and quality of the milk produced daily by each cow, and the results of giving different feed stuffs are carefully noted. As each man or student finishes milking a cow, he brings his bucket to a scale, and the manager of the dairy enters the result in a book. The results of the operations will be published later on.

The two silos, which have a capacity of 60 and 100 tons respectively, having been filled some time ago, are now being drawn upon for feeding the dairy stock in the morning and evening. Green barley and oats are the forage crops of which the contents consist. The cattle eat the ensilage with great avidity, and it is found so far that, for milk production, the barley is superior to the oats. Bran mixed with molasses is found to be excellent food, especially for calves, which receive a quantity daily, beginning with a quarter of a pint and increasing to nearly a pint. Maizemeal has been proved to be quite useless as a food for the calves unless it is first cooked.

The pure-breds of the herd include the Holstein, Jersey, Ayrshire, Devon breeds, besides which there are a few head of good cows selected from ordinary Queensland cattle herds. From the experiments already made, it is found that the Ayrshires surpass all other breeds, both for quantity and quality of milk and butter ; and for producing milk, Cape barley, as stated, has been proved conclusively to be far superior to lucerne and green oats. Experiments are now being made in crossing Ayrshires with Jerseys and Holsteins, the pure-bred cattle, however, being kept quite distinct from the crosses.

The appliances in the dairy itself are about to be greatly increased, and a refrigerator will shortly be in position. Continued experiments are being made in pasteurising and sterilising milk and cream. Butter and cheese made under different methods will be exported, and their condition on arrival in England noted. The condensation and concentration of milk and cream are also carried out. It will thus be seen that the students will have ample opportunity for thorough instruction in the whole business of dairying, under the most experienced and painstaking of instructors in the person of the Principal, Mr. Mahon.

Connected with the dairy are the piggeries, which contain 90 pigs. Arrangements are being made for importing some pure-bred stock, and for enlarging and improving the piggeries.

As soon as possible poultry-yards will be erected, and the business of raising pure breeds of fowls will be entered into.

It is astonishing to note the amount of work which has been done at the College since its opening in July of last year. Little over thirteen months have elapsed, yet the grounds are covered with good buildings and laid out with neat gardens. An avenue of trees has been planted, a new broad road across the blacksoil flat is approaching completion, some hundreds of acres are subdivided into cultivation and grass paddocks, and generally the place has the appearance of having been established for several years.

THE STUDENTS.

There are at present thirty-six students on the roll and in residence.

They work on alternate days in field, garden, carpenter's shop, dairy, and class rooms, and the course of study is so arranged that every student is afforded an opportunity of gaining instruction in each of the branches taught. The staff of teachers is not large, but sufficient for present purposes. They all speak highly of the steady attention to work shown by the lads under their charge, and, as work and recreation are judiciously blended, the most perfect discipline is maintained. The average age of the students is eighteen years, but several are over twenty-one years of age. Most of them are fairly good ploughmen, can drive an engine, have a fair idea of house-building, and some of them can lay and connect waterpipes with any plumber; in fact, the whole of the new system of pipes has been laid down by them under the supervision of Mr. Quinn, the resident engineer. Surveying they are also taught by Mr. Pitt. The favourite occupations appear to be ploughing, gardening, and dairying.

On Sundays most of the lads attend the various Church services at Laidley and Gatton. The *Church Chronicle* of 1st September says:—"We are pleased to note that several students of the Agricultural College have lately been attending the services here [Gatton] or at Laidley. Owing to provisions kindly made by the Principal, all the students desirous of attending the services are afforded every opportunity of doing so. We hope that more will avail themselves of the facilities offered."

VISITORS.

During the past three months many neighbouring farmers, and others from a distance, together with visitors from Toowoomba, Ipswich, Brisbane, and other places, have spent a day or two looking round the farm. It being the winter season, there were no field crops to be seen, except lucerne, oats, and barley; but from what could be observed of the work going on in preparation for the coming season, it was obvious to the visitors that the farm would be a sight worth seeing three months hence. It is the wish of the Principal that visitors to the College shall, previous to looking over the grounds and buildings, notify him of their visit, when he will arrange that they shall be shown over the farm and introduced to everything that is worth inspection. All visitors are invited to inscribe their names in the visitors' book in the hall.

Training at Agricultural Colleges.

THAT an idea should prevail, with many of a community, that the training of students at an agricultural college should be confined to instruction in agriculture pure and simple is not to be wondered at. By the majority of town dwellers, and indeed by most people not engaged in the industry, the term "agriculture" is held to mean ploughing, harrowing, rolling, sowing, planting, cultivating, and harvesting. How very far short does this notion of husbandry fall of the requirements of the present day! The mere fact of crop-growing is only an accessory to the deeper knowledge of the science of agriculture imperatively demanded, if the farmer is to make a success of his profession. Climates, soils, and seasons vary; hence locality, fertilisers, and times of sowing have to be studied by every man who expects to make a living from the soil. Year by year—even month by month—new implements, new fertilisers, new methods, are brought forward. These require intelligent study; and how can they be intelligently studied by him who can but plough, sow, and reap after the fashion of his forefathers? He needs as much training as the engineer,

the shipbuilder, the miner, the chemist, whose professions bristle with new ideas, the result of laborious scientific research and experiment. The wheat-grower, the sugar-planter, the sheep-farmer, &c., are not content to sit down and plod along in the old groove. They are for ever studying how to improve the article they produce, how to produce it at the lowest possible cost, and how to market it to the greatest profit. Take the sugar manufacturer. Time was, not so many years ago, when 80 lb. of brown sugar was considered a good yield for a ton of cane—640 lb. of sugar of poor quality to 8 tons of cane! Think of it! Compare the returns of the present day from the same weight of cane, when 2,000 lb. of sugar are obtained instead of 640 lb.

How has this come about? It is the result of the combined labours of the engineer, of the chemist, and of the agricultural implement maker. Look across the water to America with its enormous maize production. How does maize pay the American farmer? Ask the Chicago pork-packers. In the good old days street sweepings were thrown away; the offal of slaughtered beasts was treated in like manner. To-day science has shown how these may be utilised by the farmer.

Few farmers in this country are contented with anything but the most up-to-date implements. They live perhaps far from any blacksmith or implement maker. How are repairs to be effected? How are the horses to be shod when no blacksmith is to be found within 100 miles of the farm? We might go on to enumerate many other disabilities under which the farmer in a new country labours; but these will readily suggest themselves to the intelligent reader.

We come then to the question: How is a youth who earnestly wishes to become a farmer, and a successful one, to learn to cope with these disabilities?

The reply is: By the help of Agricultural Colleges. To attain success, he must be self-reliant—he must not depend upon outside assistance. And here is just where the great value of the agricultural training establishment is seen. Here, the students undergo a course of training which will enable them to deal with almost every mechanical difficulty they are sure to encounter in after life. They are instructed not only in tilling the soil but in all sorts of mechanical work, from mending a broken trace to driving, tending, and repairing an engine. This mechanical portion of the course is most valuable to them. All sorts of damage occur to machinery, implements, wagons, buildings, &c., and these are all repaired on the spot by skilled mechanics, assisted by a class of students to whom, eventually, much of the work is entrusted. The sinking of wells, erection of windmills, laying down irrigation plants, building houses, stockyards, piggeries, poultry-yards, erecting fences, making gates, building silos, and many other necessary works are being continually carried out for their instruction. Much hard labour is attached to these works. The pick and shovel are in constant requisition for road-making. Few would associate the latter with agriculture, but all these things tend to one end—the training of the farmer. In the school, the study of mechanical drawing is taught. Architects and builders are not found in the sparsely settled agricultural districts. The college-trained student will not need them. He has been taught to draw his own plans, to make out his own specifications, and to erect his own buildings.

Next take the instruction given in dealing with horses. The student after a few days' instruction under a good ploughman will confidently take the horses and plough, and although he will at first make poor work, yet if he is an apt pupil he will soon require little supervision. He next learns how to treat his team, how to spare them, how to feed them, how to bed them down and groom them. This is not agriculture, but without this knowledge his agriculture will be of a poor kind. He is also taught how to deal with simple ailments of the various kinds of animals on the farm, and learns thus to become, to a certain extent, independent of the vet. So with the dairy cattle. He is taught how to tell the best breeds for milking or for beef purposes. In these evil times of tick fever and tuberculosis, all the intelligent students at a college become

adepts at inoculation for the former and testing for the latter. Everything connected with dairy work is imparted to them by competent experts. After a college course of dairying, there will be small likelihood of a student going wrong in purchasing dairy stock. As to the various operations of the dairy, the most ample means of instruction in milk separating, pasteurising and condensing, in butter and cheese making, are placed at his disposal. He is also instructed in the accessory industry of pig-raising, of ham and bacon curing. He learns to kill the animals required for food, and to salt, pickle, and smoke meat, to preserve fruits as well as to grow them, to detect, distinguish, and destroy insect and fungus growth on fruit trees, to plant and prune vines, and also is inducted into the pleasant and useful art of growing vegetables of all descriptions.

In the course of these labours, many and varied implements, machines, and utensils come under his notice, with all of which he is made thoroughly acquainted. Add to all this that he goes through a solid elementary course of agricultural chemistry in a perfectly equipped laboratory, and is instructed by able chemists; that botany, physiology, animal and plant pathology, and land-surveying form a portion of his school work; and it will be seen that as an educational establishment nothing can equal a well-regulated agricultural college for fitting a youth to battle his way through life. Latin, Greek, literature, and history are good. They may make the professor, teacher, lawyer, or parson, but the backbone of the country—those by whom the former live—are the farmers. Therefore, study farming, where such a grand opportunity offers itself in your midst, and in the word “farming” include sheep, cattle, and hog raising, dairying, sugar-planting, &c. Remember that every science and every art are, to a very great extent, dependent upon agriculture. What would become of Manchester without the cotton-grower? Think of the loss that would be sustained by France and other southern European countries if the vigneron were to give up growing vines! Look at the great cities that have arisen, and at the vast fortunes which have been made, solely by the help of the farmer who marched his crops of maize to market on four legs—pig’s trotters! To go further afield, let us suppose the tea-growers of India and China and Ceylon to abandon the pursuit, or the indigo-planters and the wheat-growers of the world to go on strike, what would become of the world? The world depends wholly and solely on the farmer. Therefore the farmer should call in every aid to help him to farm on such principles as will insure to him good crops, good markets, and good prices. And all these aids are, or rather the preparation for them is, at his hand in all parts of the civilised world in the shape of training establishments, whether they be called colleges, experiment stations, or dairy schools. The wise youth will know how to enjoy these blessings, and make good use of them later in life.

Agriculture.

FURTHER NOTES ON PULSES SUITABLE FOR GREEN-CROP MANURING.

By ALBERT H. BENSON.

IN the May and August numbers of this *Journal*, I have already given a short description of two pulses suitable for green-crop manuring—viz., the Velvet and Black Mauritius Beans, both of which are varieties of the Cowage, *Mucuna pruriens*, var. *utilis*; and in the present article I purpose dealing with varieties of two other species of pulses that we have been testing at the Redland Bay Experiment Orchard, and some of which seem to be admirably adapted to the



PHASEOLUS LUNATUS, var. INAMÆNUS.

conditions prevailing there, as, though their growth has not been as rapid as that of the Velvet Bean, it has been heavier, and they have continued their growth and produced blossoms and seed throughout the winter. The Velvet Bean, on the other hand, died after ripening its fruit; and the Black Mauritius Bean, though it has ripened its fruit during the winter, has made little if any growth, and has lost a large part of its foliage. The pulses I will deal with first are varieties of *Phaseolus lunatus*, the well-known Lima Bean, and of these varieties the one that has done the best is one that I obtained from Macknade Plantation at the same time that I obtained the Black Mauritius Bean I have already described, and was given to me by Mr. Farquhar, of the Colonial Sugar Company, as the Small Mauritius Bean, as distinct from the large or Black Mauritius Bean.

SMALL MAURITIUS BEAN.

The seeds of this bean were sown on the 13th of December last, single seeds being sown 8 feet apart each way; they were not staked. The preparation of the land was similar to that given in the case of the beans already described, so I need not repeat it, but will refer to the previous numbers of this *Journal* (Vol. III., pt. 2, p. 151).

The growth at first was somewhat slow, but, as soon as the plants commenced to run, the growth was rapid and the vines soon covered the ground with a mass of stems and foliage through which no weeds could grow. No flowers appeared before May, and the first blossoms were infertile, no pods setting before July. Since then the plants have bloomed profusely, and set a large number of pods containing from three to four seeds in each. The seeds are similar in shape to the Common Lima Bean, but are smaller and vary in colour from a yellowish-white to a mahogany-brown, various coloured seeds being found in the same pod. The bulk of the seeds are, however, of a yellowish-white colour with veins of pale pink showing through the skin, but a large number are more or less mottled. The seeds are a good vegetable, used in the same way as the Lima Bean. Where a crop of seeds is required, this bean should be grown on a trellis, as it fruits much better off than when allowed to trail on the ground; a portion of some of the plants that climbed over adjacent fruit trees proving this.

This bean will, in my opinion, prove to be one of the most valuable pulses to grow for green-crop manuring on the red volcanic soils of coastal Queensland, as it produces a dense mass of foliage, and seems to stand the heat and excessive moisture of summer and the comparative dryness and cold of winter equally well. I have no doubt that it will also make an excellent fodder if dried and made into hay, though on account of the small quantity available I have not been able to test it in this respect, but hope to do so during this coming season, as I intend extending its cultivation and, amongst others, testing its qualities as a green manure for bananas and other crops.

HORTICULTURAL LIMA, OR MADAGASCAR BEAN.

The second pulse of this species, that has been tested, is the variety known as the Madagascar Bean, or Horticultural Lima (*Phaseolus lunatus*, var. *inamænus*), a bean that is well known in this colony, but which is deserving of much more extensive cultivation than it receives at present, as it is a most valuable vegetable—the seeds, used either green or in their dried state, forming a very palatable and highly nutritious food. The unripe beans are cooked in a similar manner to broad beans, but the dried beans require soaking for twenty-four hours previous to use.* The immature pods may also be used as French beans, but it is a pity to use them in this manner, as the unripe beans are a much better vegetable.

* The excellence of the ripe bean as a vegetable is undeniable.—Ed. Q.A.J.

The beans of this variety are similar in shape and size to the Common Lima, but instead of being white like that variety they are mottled, brownish-mahogany, and dirty white, spotted with brownish-mahogany. This variety was planted on 2nd November, and the growth during the summer and early autumn was slow. It commenced bearing in June, but no beans were fully matured till August. It has blossomed and fruited well during the winter, but has not made as strong a growth as the preceding variety. It will probably prove of considerable value for green-crop manuring, but it should certainly be grown as a vegetable to a much larger extent than it is at present. Like the preceding variety it should be grown over a strong trellis if a crop of seed is desired, as it sets its fruit much better off than when allowed to trail on the ground. Two other varieties of this species were tested—viz., the Common Lima and Burper's Bush Lima; but, as these varieties are more valuable for their seeds than for the amount of green stuff that they produce, they can be left out of account as pulses suitable for green-crop manuring.

The other class of pulses tested consists of varieties of *Dolichos Lablab*—the Lablab or Sim Bean of India; and of these the one of greatest promise was obtained by me from Mr. Fraser, of Stone River, near Ingham, and is locally known as the Poor Man's Bean, though quite distinct from the Sword Bean (*Canavalia gladiata*), which is also known as the Poor Man's Bean.

POOR MAN'S BEAN.

This bean is known botanically as *Dolichos Lablab*, var. *purpureus*, or as *Dolichos purpureus* (Maiden), and is sometimes called the Tonga Bean (Maiden).

The flowers, stems, and pods are of a purplish colour, and the pods when young can be used as French beans. The beans are roundish oval, having a prominent white keel, with which they are attached to the pod, and are of a darkish-brown colour more or less mottled or speckled. Specimens of this bean are to be found in many of the coastal districts of the colony, but it has not been cultivated to any extent, nor do I know of anyone who has tried it for green-crop manuring.

At Redland Bay it has made an extraordinary growth, beating every other variety of pulse that we have tested, both as regards the quantity of green stuff and of seed.

It was planted on the 2nd November in a row, single seeds being planted 4 feet apart in the row. The beans were staked, a light trellis consisting of an upright of about 6 feet in height placed alongside of each bean and connected on the top with light saplings, and the beans were trained over same. This trellis was, however, quite inadequate, as the beans made such a vigorous growth that they not only completely covered the trellis, but they also formed a dense mass on the ground to at least 15 feet on each side of the trellis, which effectually checked the growth of all weeds.

Like the Small Mauritius Bean the growth at first was not rapid, but as soon as the plants started to run the growth has been very vigorous. The plants commenced to blossom in June, and have continued to blossom and ripen their pods throughout the winter, the plants at present (September 1st) being a mass of flowers and pods. Unlike the other pulses tested, this bean seems to fruit equally as well when growing on the ground as when on a trellis, so that its cultivation for seed will not necessitate trellising, although it may be advisable to do so, as the pods will probably mature better when trellised than when allowed to lie on or near the ground. The manurial and feeding value of this bean will be carefully tested during the coming season, and should same prove to be satisfactory it will, on account of its extremely vigorous growth, be a valuable addition to our green manures.

THE LABLAB.

This bean, which is also known as the Madagascar or Tonga Bean, resembles the preceding variety, but differs from it in that it is of a much less vigorous habit of growth, has larger beans, the pods are broader and less wrinkled, and the beans are usually darker. At Redland Bay it has not made a strong growth, but has produced a heavy crop of beans. The young pods can be used as French beans, but the beans of this and the preceding variety are inferior to those of the Lima varieties. For green-crop manuring, the Lablab will be of little value, as on soils such as that of Redland Bay it does not make a sufficiently vigorous growth.

The illustrations herewith give a very good idea of the foliage, flowers, pods, and beans of the Small Mauritius Bean and the Poor Man's Bean—the two varieties, which, in view of the experience obtained at Redland Bay, I consider to be the most promising pulses that we have grown there for green-crop manuring. Whether they will do equally well in other kinds of soil is a matter of testing, but for the red volcanic soils, such as that of Redland Bay, they have certainly proved to be hardy, vigorous growers, and to produce the largest quantity of foliage of any of the pulses that we have tested. The red volcanic soils of the coastal districts are distinctly deficient in vegetable matter, and therefore pulses, which produce such a quantity of foliage as these two, should be of especial value to such soils for the purpose of green-crop manuring.

THE PIGEON PEA.

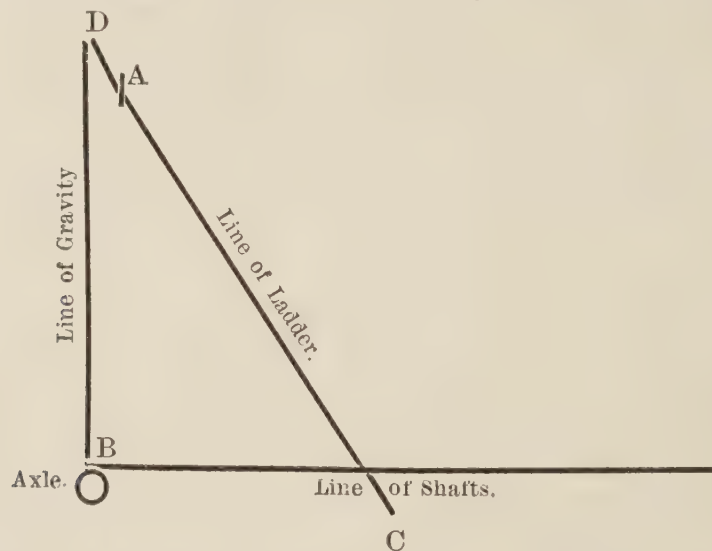
IN our June issue of the *Journal* it is stated in Mr. J. F. Bailey's article on the Dâl or Pigeon Pea (p. 473) that the crop had turned out most satisfactorily, both as regarded weight of fodder and value as feed for stock, the dairy cattle being especially fond of it. Since this was written we find occasion to modify our eulogiums on this fodder plant. It is true that the crop is a heavy one, and that the cattle take to it when it is young and succulent. But when chaffed and placed in the silo, it is found that it is a rank failure. And not only is it useless itself, but by its coarseness and its mouldiness it destroys the better part of a whole mass of corn, barley, and oats in the same silo. The stock will not touch it. The whole of the Pigeon Pea packed into the silo at the Queensland Agricultural College became mouldy, and was fit for nothing but the manure heap. And this was not the only trouble. The stalks left in the field (5 feet high) had to be grubbed out with axe and grubber, much as a young scrub grown up in an abandoned selection has to be grubbed. We strongly advise farmers to have nothing to do with a crop which is inferior to any other fodder crop grown in Queensland, and which gives so much labour in the field after it is cut.

A GOOD GARDEN AND ORCHARD APPLIANCE.

By PHILIP MAC MAHON,
Curator, Botanic Gardens.

ONE day, looking at the members of the Fire Brigade drilling with their fire-escape, the notion occurred that some simple modification of that machine might be turned to good account in the garden and orchard. You know how awkward the ordinary ladder is to handle. If of any length it takes two men to carry and raise, and then you must have something to lean it against which will be pretty solid. It will crash into the top of a fine tall shrub, and perhaps break a few branches or displace many flowers or fruit. Plants with wide-spreading delicate branches you cannot get near at all, since you have nothing to lean your unwieldy ladder against. If you use "double ladders" or "steps," you

can only reach a small height, and you must have a man to hold them to prevent you from descending with more force than dignity. There happened to be here a pair of iron wheels belonging to a worn-out mowing-machine, and upon these were built the ladder shown in the illustration. The ironwork was made by an ordinary blacksmith, and the whole can be put together by any handy man. The most practical way to set about the job is this: Choose a level place of sufficient size, make a line to represent your centre of gravity, where the weight of the man in the top falls, then a line at right angles to represent your shafts. Then a line the length of your ladder, remembering that the top must not protrude beyond the centre of gravity. A stick or cord the length of your ladder will enable you to get the necessary rake, which you can make to suit your own inclination. Your props will be from A to B; your ladder from C to D. The ladder must project below the shafts a distance equal to the diameter of the wheels. It must be set out full size, and then you can measure off the lengths you want, thus:—



You want two pieces of hardwood, 3 inches by 2 inches, for shafts; two pieces, 3 inches by $1\frac{1}{2}$ inch, for props; and a few lengths $1\frac{1}{2}$ inch by 1 inch for braces.

You attach a stout piece of hardwood along the top of your axle by two clamps of iron, and then attach first your shafts, and then your props, and then your ladder, using bolts if possible. Ours is made so that it can be taken to pieces in a few minutes.

You must brace the supports with light pieces as shown in the photograph, also the shafts. This makes the whole affair quite rigid. Cut your shafts to suit yourself and trim the handle, but the longer the shaft, within convenience, the greater the lifting power.

Our ladder is 20 feet long. One man can not only wheel it and work it easily, and reach any bough 23 feet from the ground, but by "chocking" the wheels he can turn the ladder down so as to run under overhanging boughs, &c. The man seen in the top of the ladder feels far more safe and comfortable than he would in an ordinary ladder. It may be much higher than this.

The cost of ours was as below, but a "bush" ladder can be rigged up for less:—

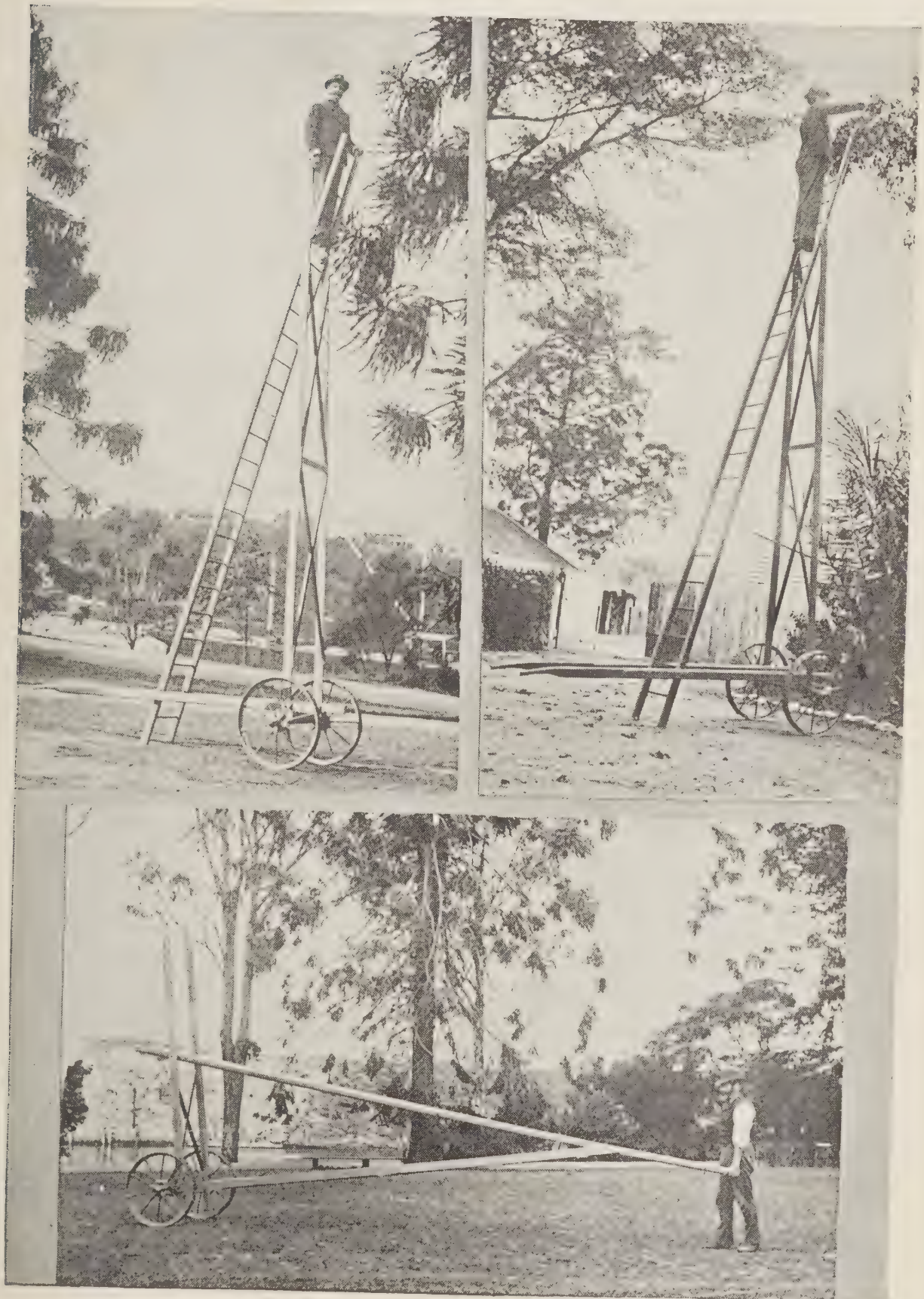
Ladder (20 feet, highly finished)	...	£1	0	0
Timber	...	0	5	0
Paint, two coats	...	0	5	0
Bolts and iron	...	0	2	6
Labour (two days)	...	0	12	0
£2 4 6				

Of course it must not be used on inclines sideways on. A plumb-line from the top must always fall well between the wheels near the centre of axles. If you do not grasp this elementary principle of statics, better not venture your neck on this (or any other) ladder.



DOLICHOS LABLAB, var. PURPUREUS.

Plate LII.



A GOOD GARDEN AND ORCHARD APPLIANCE.

POTATO CULTURE.

POTASSIUM SALTS AS THE BASIS OF POTATO FERTILISERS.

OF all crops grown, the potato is the one which shows the greatest content of potash in the mineral constituents withdrawn from the soil. Hence the well-known value of soil derived from granitic detritus for potato culture. In it we have abundance of potassium silicate derived from the decomposing felspar and slowly set free in other forms for the uses of the plant. Hence may be gathered the datum that, given a soil not very liberal in its return of tubers, the defect is probably in that the potash percentage is low.

Where ground has been annually cropped with potatoes for many years without a rotation, it is mainly owing to the potash having been used up. Then the remedy is to supply that ingredient. This may be done either by a direct application of sulphate or chloride of potassium as a chemical top-dressing, or by a proportionate quantity of wood ashes.

The matter has been gone into carefully by the United States Experiment Stations from 1888 to 1896 . . . Part of their summing up was as follows:—

“Two hundred pounds sulphate of potash produced an increased yield slightly exceeding that given by 80 loads of stable manure. The results were the same with potassium chloride. There was a profit of 21·438 on the plot with sulphate of potash alone. The increase on plot 11 with 80 loads of barnyard manure did not yield enough per cent. to pay for the hauling out of the manure. The results show that the profit is in the use of potash compounds, and that the money spent on ammoniac sulphate and superphosphate was entirely lost” [meaning in potato culture].—M. A. Servell, Kentucky Experiment Station, 1888, Bulletin No. 16.

“Neither superphosphate nor nitrate of soda (Chili saltpetre) used separately or together were of appreciable benefit; but when either was used with sulphate of potash, great advantage accrued.”—*Idem*, 1889, Bulletin No. 22.

“The experiments of three years, 1884-1886, show that the yield was largely increased by fertilisers containing potash. In 1884 the plot receiving potassium chloride was free from scab.”—M. A. Goessmann, Massachusetts Experiment Station, 1886.

“The soil here is gravelly loam. Potash was evidently more beneficial than either superphosphate or nitrogen (ammoniac nitrate). Alone, it pays by itself and more, but is more effective when used in conjunction with both phosphoric acid and nitrate of soda. For the soil, the formula of a fertiliser would be about as follows:—Nitrate of soda, 30 lb.; superphosphate, 60 lb.; chloride of potassium, 100 lb.”—W. L. Phillips, Marblehead Experiment Station, 1892, Bulletin No. 18.

“Soil, a heavy loam. The average of three years' experiments shows that nitrates produced 10·74 bushels increase, phosphates 10·11 bushels, potash 41·45 bushels. It is clear, then, that in this soil the commercial fertilisers should contain much more potash than is usually the case.”—L. W. West, Hadley Experiment Station, 1890.

“Every test adds to the position that vastly more potash is needed than our potato fertiliser manufacturers give us. The average fertiliser (New Hampshire) should be phosphoric acid, 9-11 per cent.; nitrogen, 2-4 per cent.; potash, 9-15 per cent.; whereas the fertilisers in the market average—Phosphoric acid, 11 per cent.; nitrogen, 2·5 per cent.; and potash, 2·5 per cent. only. I recommend (of course, for potatoes) dissolved bone black (*i.e.*, superphosphate), 340 lb.; potash chloride, 160 lb.”—E. S. Whittlemore, Colebrook (N.H.) Experiment Station, 1890, Bulletin No. 12.

“To plot 5, no fertilisers were added. To plot 3, 400 lb. of superphosphate and 800 lb. kainit (potassium and magnesium chloride) per acre were applied. The yield of plot 5 was 86½ bushels per acre; that of plot 3

was $161\frac{1}{3}$ bushels per acre. Result of experiment shows that kainit alone increased the product 40 per cent., and application of 800 lb. kainit and 400 lb. superphosphate per acre fetched up to 115 per cent."—D. D. Zohmor, West Virginia Experiment Station, 1892, Bulletin No. 20.

These details speak for themselves. The fertiliser for potato land is pre-eminently potash in one or other of its commercial forms, and, by its use, the injury and pauperising of the soil by continuous year-after-year cropping without a rotation change, as is so often done at the Cape [of Good Hope], is capable of remedy.

It may not be of very much importance as things stand at present, but, as a counsel of perfection, it will be found that sulphate of potash, though more expensive than chloride salt, is preferable if the higher cost can be borne.

One has to reckon with the disadvantageous effect of the chloride element in the other case; and it seems generally allowed that soft, watery potatoes are often produced by the action of the potassium chloride upon the starch-content of the cells of the tuber, while this does not seem to be the case with potassium sulphate.

The following is an average potato fertiliser* on these lines:—

Potassium sulphate (grade of 27 per cent. potash) ... 200 lb.

Superphosphate (12 per cent.)... .. 300 lb.

Sodium nitrate 150 lb.

The above we have taken from the *Agricultural Journal* of the Cape of Good Hope, as it appears to us that the experiments here recorded and their results should prove of infinite value to farmers. No man can be styled a perfect farmer who does not thoroughly understand potato culture. Anyone can plant potatoes, but to obtain heavy crops of the most marketable varieties it is necessary not only to plant properly, but to cultivate thoroughly and prepare the ground on scientific principles.

We remember a case on the Logan River many years ago, where a farmer, who posed as an authority on all farming matters, put in a few acres of potatoes. Some weeks after planting, he visited a neighbour whose potato crop was making a grand show. His own crop was coming up straggly, and half of them had not shown at all. His neighbour asked him if his seed was shooting when he planted them. "Oh, no," he said; "but that does not matter, they will shoot in the ground as well as in the barn." But the ground was a mass of weeds before the potatoes appeared at all. This man did not understand the first principles of potato-growing; the result was that he had to plough up the land, and so lost the whole of his seed, which in those days ran up sometimes to £12 per ton.

COTTON-SEED—ITS PRODUCTION AND USES.

At the Millwall Docks in London one can frequently see steamers discharging into barges small, black, downy seeds, resembling tiny pebbles that have received a slight sprinkling of snow. On inquiry one finds that the steamers are unloading cotton-seed from Egypt, the slight coating of white which adheres to the seed being cotton-lint. From the ship's hold the cargo is discharged by buckets into hoppers, from which projects a succession of spouts. The seed is weighed on scales fitted inside the hoppers, and is then shot, by the pulling of levers, through the spouts into the barges. If the latter are followed to their destination it will be found that they are bound for oilseed mills, where the seed is received. From the mills it reappears, but in other forms. What went into the mills as cotton-seed comes out as cake and oil.

* A cost of £2 18s. per acre.—Ed. *Q.A.J.*

The seed has been crushed by powerful machinery, and the result is about 20 per cent. of oil, leaving a residue of about 80 per cent., which is made into cake for sheep and cattle feed. The oil in its crude state is used chiefly in the manufacture of soap, and it is largely exported to the Continent for the same purpose. Refined cotton-seed oil is also exported to the Continent, where it is used for edible purposes. Roughly, one-half of the total British make of oil goes abroad. It is a pleasant fiction to suppose that the oil which we use for dressing salads comes exclusively from olives. Frequently the name of olive is a mere courtesy title; cotton-seed oil forms the principal ingredient which flavours the succulent salad. But in these days of adulteration there is nothing startling in that fact.

EGYPTIAN COTTON-SEED.

Fully nine-tenths of the cotton-seed imported into this country come from Egypt; the remaining tenth is exported by America, Smyrna, and Mersyne. Let us follow the seed from its growth in Egypt to its conversion in England into cake and oil. In Lower Egypt, where the bulk of the cotton crop is grown, sowing usually begins in February and continues throughout March and April. The sowing commences in the southern provinces of the Delta, and gradually extends to the northern provinces. A comparatively small area is also sown in Upper Egypt and the Fayoum district. If the plants receive the normal heat of an Egyptian summer; if worms do not play havoc with them when flowering; if the water supply is sufficient and regular; if frogs do not retard the progress of growth—given these conditions, the cotton-trees are likely to be covered with flowers and bolls by the month of August, and the first picking in Lower Egypt will commence in September. In Upper Egypt and the Fayoum the crop commences in August, and the earlier arrivals of cotton and cotton-seed in Alexandria, the port of shipment, are from those districts. The height of the Nile is the most important factor bearing upon the welfare of the cotton crop; and it is but natural, therefore, that this river, which is the life-blood of Egypt, should receive careful, constant, and, at times, anxious attention. The fluctuations in the height of the Nile are of absorbing interest to the Egyptian grower; the Nilometer is to him, but in a greater degree, what the barometer is to the English farmer. August is the most critical period for the crop; during that month an anxious time is experienced.

“PICKING”

means extracting from the ripe bolls the seeds which they contain. The seeds are covered with fine downy hairs. These hairs are the raw cotton of commerce. Their commercial value varies with their length and their degree of fineness; the longer the staple and the finer the fibre, the higher are the prices obtainable for the cotton. Similarly, the quality of the seed depends upon the percentage of oleaginous matter which it contains, and upon its freeness from lint. For the next step, after picking and drying, is to send the seed to the “barber’s shop” to be “shaved”; the closer the crop, and the balder the seed is rendered, the more successful is the operation. Here, however, the metaphor fails, for the hair of the seed is of considerably greater value than the seed itself. The latter is separated from the lint by means of machinery, technically known as “gins.”

GINNING COTTON

has now been brought to a high state of perfection in Egypt. The Egyptian gins are of the most modern type; they are perhaps the finest in the world. They work both expeditiously and effectively, and the result is that Egyptian cotton-seed is cleaner (in the sense of being freer from lint) than any other. The cake made from cotton-seed other than Egyptian is not in general favour with consumers, owing to the quantity of lint which is left on the seed; the cake has excessively binding effects which are apt to be injurious to cattle. Unimportant shipments of American seed, chemically delinted, occasionally

reach this country, and delinting by means of friction is now being tried in the States for export purposes. But, as already stated, Egypt is practically the only exporting country, and her monopoly of the trade is, for various good reasons, not likely to be seriously disturbed.

SHIPPING.

After being ginned at the factories, the seed and the cotton are sent down together by rail to Alexandria for shipment to the various distributing and consuming centres. The cotton is baled, pressed by steam, and shipped, principally to Liverpool; and a large quantity also finds its way to various Continental ports. America takes a fair and an increasing number of bales, and a few are shipped to India, which, on the face of it, appears like sending coals to Newcastle. But Egyptian cotton is long of staple and fine of fibre, like the famous Sea Island quality grown in Georgia, South Carolina, and the adjacent islands, and can be used for purposes for which the ordinary short-stapled American and Indian cottons are unsuitable. The seed is shipped in bulk, usually by "tramp" steamers, the owners of which derive a considerable revenue, during the autumn and winter months more particularly, from this particular trade. Shipments are made either in "cargoes" or "parcels"; a cargo is owned by one shipper, parcels by more than one. Cargoes almost invariably go to outports in the United Kingdom (*i.e.*, to ports other than Hull, London, and Liverpool), or to Continental ports. Parcels are shipped by steamers which are either chartered, usually in London at the "Baltic," or put on the Alexandria berth at whatever rates of freight may be procurable.

THE MOST IMPORTANT MARKET.

Hull is by far the most important market for cotton-seed in this country, as the following figures will show. Shipments from Alexandria during the season commencing September, 1896, and ending August, 1897, were:—To Hull, 195,500 tons; London, 61,500 tons; Liverpool, 19,000 tons. Outputs: United Kingdom, 95,000 tons; Continent, 45,000 tons—total, 140,000 tons. It will thus be seen that Hull receives nearly one-half of the total quantity exported from Egypt. The Bristol Channel, is, after Hull and London, the most important crushing centre in England; in Scotland, Leith, and Burntisland supply the east coast and Glasgow the west. Cotton-seed is an article of constantly fluctuating value, but during the last few seasons prices have generally ranged between £4 10s. and £5 per ton. In sympathy with produce generally, cotton-seed has fallen in value during recent years.

THE UTILISATION OF WASTE.

Cotton-cake is a striking exemplification of the modern tendency to let nothing be wasted. Formerly, cotton-seed was imported solely on account of the oil which it contained. After the oil was extracted, the residue—"refuse" was the word employed—was used as manure and fuel. In course of time, however, the valuable discovery was made that the despised refuse contained ingredients of great nutritious value for feeding sheep and cattle. The discovery gave an impetus to the cotton-seed trade, which has led to its present position of great and growing importance. Even at the present day the intrinsic value of cotton-cake as an article of food for cattle and sheep is not universally recognised by many British farmers, who, with the conservatism which is one of their leading characteristics, are slow to change from the usages of their fathers. Linseed cake, notwithstanding its greater expense, is in more general use, except when, as at present, the supply of linseed is short; the binding qualities of cotton-cake tend to prejudice farmers against it, but in wet weather its value as a feeding stuff is universally recognised. The crush of cotton-seed in America is, of course, considerably larger than that of Egyptian seed in England. In recent years it has ranged from about 1,000,000 to 2,000,000 tons during a season.

THE AMERICAN CROP.

The cotton crop of 1898 in America is the largest yet recorded, but it does not necessarily follow that the crush of seed will exceed past records. The crushing conditions in America are not identical with those which obtain in this country. Considerable expense attaches to the carriage of the seed from the plantation to the mills, and if the prices offered by the crushers to the planters are not sufficient to cover expenses and leave a margin of profit, the planters prefer to utilise the seed for purposes of fertilising and fuel. A certain proportion of the seed is invariably required for manure, whereas in Egypt the Nile is the sole fertiliser. The prices which crushers offer are regulated by the values of the seed-products; these, therefore, are the real factors which govern the size of the crush. The general practice in America is to "hull" the seed, which consists in removing the hulls or outer shells prior to crushing. In England this practice is not followed, and the quality of the oil consequently suffers to some extent. But the hulls are used for feeding purposes, as well as the farinaceous matter which, when crushed, is known as cotton-seed meal.

THE USES OF COTTON-OIL IN AMERICA

depend upon a variety of circumstances. Five years ago, when hogs were scarce and lard was dear, fully half the quantity of oil extracted from the seed was used in lard substitutes. Since that time, however, cheap maize having stimulated the rearing of hogs, the value of lard has fallen materially, thus curtailing very considerably the use of cotton-oil in lard compounds. Any material advance in the prices of lard would at once re-stimulate this trade, and create a large demand for cotton-oil as a substitute for lard. The American make of cotton-oil goes into a variety of commodities, comprising compound lard, margarine, and cottolene; it is extensively used for salad and culinary purposes, for packing sardines, and, particularly, for soap-making. It is also used both in America and England for adulterating higher-priced lubricating oils. Both in Europe and America the price of tallow has a direct bearing upon the value of cotton-oil for soap-making. American refined oil finds a ready market on the Continent of Europe, where the quality is held in high esteem. Shipments from the United States to France have in recent years been of great and growing magnitude, and French crushers both of cotton-seed and brown nuts have in consequence suffered very severely by the competition. Efforts, so far unavailing, have been and are being made in France to promote legislative action designed to curtail, if not to kill, the import trade by means of prohibitive duties. Were it not for the tariff-wall which shuts out refined cotton-oil from Italy, the peasants of that country would use it in enormous quantities for edible purposes. And Spain, the country of the olive, has been obliged to protect that important industry from certain demoralisation by enacting that a gallon of creosote shall be put into every barrel of cotton-oil which enters her dominions.—*British Trade Review*.

WHOLE CORN IN THE SILO.

IN filling whole corn into the silo, it is obvious that the corn should not be laid with butts all one way, but after one course is laid the next should follow with the butts lying on the heads of the first course. A writer to the *Rural New Yorker* says:—

I lay in courses one way, and then the next layer opposite. The broken stalks, leaves, &c., are jammed into the corners, or driven in with a wooden beetle. I do not rush in filling, as I like to have it settle as much as possible in the filling process. At the end of the week, on Saturday, I place planks on the corn in order to get more pressure. Monday, we go at the filling again, if the weather permits. If not, we wait for a fair day. I keep filling in this way until the corn is about 6 or 8 inches above the top. I wait for it to settle

about a foot, and then I put on top of the corn any old hay that I may have. After the hay is put on as evenly as possible, I place the planks on. These planks are cut to fit the silo tight. On top of the planks I place about two tons of sand in bags. The bags are distributed evenly over the planks; and if one end goes down faster than the other, we move the bags. The idea is to settle the mass as quickly as possible. When I open the silo, I find the hay a mass of wet and rot, but not a particle of mould or rot is to be found on the corn. It seems to me that the trouble lies not so much in the packing (although the man in the silo needs watching) as it does in the covering and weighting.

My silo settles about one-third, and when opened is as solid as a rock. The stalks are all jammed together, and we cut it with the broad axe into squares of about 6 inches, and it comes out solid, like a cake of ice. This is put into trucks and rolled in front of the cattle, and fed out to them as much as each cow needs—no regular amount, as some cows need more than others. One man does the feeding all the winter, and so each cow gets about the same each time. Two men cut and get out of the silo enough for two feeds (twenty head of stock) in half-an-hour. I do not for a moment think cut ensilage is not the best; but as long as mine comes out as well as it has done in the past, I do not think it would pay me to go to the expense of buying a machine for cutting. Let the farmers put on heavy weights, and their corn will not mould if it has been packed properly. I do not believe it is a job that can be hurried. I take about seventeen days for mine, working three men. We cut enough in the morning early to last all day. I use sand for weighting, because, after it comes off the silo, I can use it behind the cattle.

TOBACCO AS A PERENNIAL.

A NEW feature in the way of tobacco-planting comes to us through the medium of the Jamaica Agricultural Society, in an article by Ivan van Lantay in the *Melbourne Weekly Times*. Up to the present no one suspected that the tobacco plant could be treated as a perennial. It has fallen to Mr. W. Daroczi, Budapest, Hungary, editor of *Magyar Dohanyjnjsag*, a newspaper devoted to tobacco and its culture, to discover this feature of the tobacco plant; and he maintains that each succeeding crop of leaves is heavier and of better quality. This presents a new aspect in tobacco culture, for, to a great extent, it does away with the laborious work of transplanting.

It seems peculiar that this perennial quality of the tobacco has not been discovered before, although, within the last few years, in Germany, some experiments have been made, but very few have known it.

Mr. Daroczi made his first experiment in 1894, when he put into pots some Ghinbeck plants, which he kept in a room during the severe European winter. These plants bloomed again the following year, with the astonishing difference that the leaves were better, larger, and of good quality. He made his experiment in 1895 on a larger scale, and gained excellent results. These plants he exhibited at the "Millenium" Exhibition at Budapest the same year, where they created a sensation among the experts.

Mr. Daroczi's method is as follows:—The roots of the plants must have a good strong hold in the ground. After the crop has been harvested, the stems should be cut down to the level of the ground; then, with hoe or small plough, cover the rows of stems with earth; this provides a protection against frost (specially in cold countries). The following season the plants start into growth. Being hardened, they are not so sensible to inclement weather. At the time when others are being transplanted, these will have mature leaves.

In connection with the above-mentioned discovery, Mr. Daroczi has made another one—namely, that the tobacco plant can be propagated by layers. If a layer is plucked from the plant, although without roots, yet it will grow if put

into the soil. The advantage in such propagation is that the layer plant will resist the ravages of insects far better than young plants. Layers will also yield early and yet vigorous plants. It is desirable that growers should make experiments of both these discoveries. I myself tried them, and was satisfied with the result. On my plantation, on the King River, I have left four acres with the plants, and next year they yielded leaves, and specially on two acres I have beautiful crops, although I have not covered the cut stock with soil. That the stock has not been destroyed during the cold season I attribute to the fact that the winter is not so severe here as in some parts of Europe and America.

Anyhow, the idea deserves to be experimented upon a large scale, and so assist the solution, for certain, of the question. The discovery is really epoch-marking in its character, because it touches the most important and delicate and expensive operation—namely, transplanting—on which so much depends as regards quality and early maturity. What advantage this presents to the grower! No sowing, no hot-beds, no transplanting, and yet early plants and strong stems in the second year.

I have discussed the matter with Mr. A. J. Bondurant, the Government Expert, who has already heard of this from America, and that in America the new methods have been taken up with enthusiasm. He thinks they will show good practical results if carried out scientifically. He advised growers to experiment, as the conditions here are favourable for it, and he himself intends to do so next season, and for that purpose he has kept some plants for next year. The experiment is worth while trying, as it does not require any large outlay, only a little labour and close attention, even if it does not bring additional knowledge, so teaching the grower the possibility of finding out something new. I shall be pleased to hear the results of experiments in the interests of tobacco culture. I myself intend to bring all possible data before the growers, as I am in personal communication with Mr. Daroczi.

Another experiment is being made in Florida (U.S.A.), where 200 acres of tobacco have been shaded with slats, after the fashion of a huge bush-house. On another estate the entire field is closed in above and on the sides with cheese cloth. Mr. Nevill, Government Tobacco Expert, states this as a fact. It used to be a standing joke in this colony that farmers should shingle their farms to protect the crops from hailstones. In America this roofing-in is actually done.

TOBACCO.

TOBACCO-GROWERS this season will have an excellent opportunity of observing how tobacco should be sown, grown, harvested, cured, and marketed for profit. Mr. Nevill, Tobacco Expert to the Department of Agriculture, has prepared and sown seed beds at the Agricultural College, and will plant out five acres of tobacco on two different soils—one a heavy, rich, deep black loam; and the other a poor, sandy, shallow soil, overlying a rocky bottom. He will devote special attention to the work in all its stages, and the results will be published in this *Journal*. Given reasonably fair weather, this practical experiment, on a tolerably large scale, by a practical man like Mr. Nevill, should go far to decide the question as to profitable tobacco-growing by the Queensland farmer. No doubt the weed has paid growers well in the past; but the question now is of putting the industry on a firm basis, and of establishing a European reputation for Queensland tobacco. Mr. Nevill is confident that this can be done, and he proposes to prove it, not by theories and lectures, but by practical demonstration. We would advise farmers to pay a visit now and then to the College and get a lesson in tobacco cultivation. The seed was sown on 20th August, and will be planted out towards the end of September.

Dairying.

DAIRYING COMPETITION.

MILKING COMPETITION AT GATTON.

FIVE cows competed for prize donated by Department of Agriculture, for the highest quantity butter produced during two consecutive days. The first prize was awarded to Nancy with a yield of 3·884 lb., and second place being occupied by Lofty with a yield of 3·56 lb. of butter.

A prize, given by Mr. F. Cardew, under similar conditions, was won also by Nancy, and Lofty second.

WEDNESDAY, 27TH JULY, 7·30 A.M.

Class 88.—Best cow in milk.

Nos.	Names.	Pounds of Milk.	Butter Fat Test.	Commercial Butter.
2	Buttercup	14 $\frac{1}{2}$	2·9	·47
3	Nancy	29 $\frac{1}{2}$	2·4	·792
5	Joan	20 $\frac{1}{2}$	2·8	·642
4	Polly	18	3·0	·604
8	Lofty	29 $\frac{3}{4}$	2·6	·866

Class 89.—Best dairy cow.

2	Nancy	29 $\frac{1}{2}$	2·4	·792
3	Buttercup	14 $\frac{1}{2}$	2·9	·47
4	Joan	20 $\frac{1}{2}$	2·8	·642
5	Lofty	29 $\frac{3}{4}$	2·6	·866

WEDNESDAY, 27TH JULY, 1898, 5 P.M.

Class 88.

2	Buttercup	13 $\frac{1}{2}$	3·4	·514
3	Nancy	20 $\frac{1}{2}$	4·8	1·102
5	Joan	16 $\frac{1}{4}$	4·8	·873
4	Polly	11	4·1	·505
8	Lofty	18	5·0	1·008

Class 89.

2	Nancy	20 $\frac{1}{2}$	4·8	1·102
3	Buttercup	13 $\frac{1}{2}$	3·4	·514
4	Joan	16 $\frac{1}{4}$	4·8	·873
5	Lofty	18	5·0	1·008

THURSDAY, 28TH JULY, 1898, 7·30 A.M.

Class 88.

2	Buttercup	18	3·9	·786
3	Nancy	29 $\frac{3}{4}$	3·0	·999
5	Joan	20 $\frac{1}{4}$	3·2	·725
4	Polly	17	3·5	·666
8	Lofty	26 $\frac{1}{4}$	2·5	·734

Class 89.

2	Nancy	29 $\frac{3}{4}$	3·0	·999
3	Buttercup	18	3·9	·786
4	Joan	20 $\frac{1}{4}$	3·2	·725
5	Lofty	26 $\frac{1}{4}$	2·5	·734

THURSDAY, 28TH JULY, 1898, 5 P.M.

Class 88.

2	Buttercup	11 $\frac{1}{2}$	5·3	·682
3	Nancy	19 $\frac{1}{4}$	4·6	·991
5	Joan	15 $\frac{1}{2}$	3·8	·659
4	Polly	12 $\frac{1}{4}$	3·9	·535
8	Lofty	20 $\frac{1}{4}$	4·2	·952

Class 89.

2	Nancy	19 $\frac{1}{4}$	4·6	·991
3	Buttercup	11 $\frac{1}{2}$	5·3	·682
4	Joan	15 $\frac{1}{2}$	3·8	·659
5	Lofty	20 $\frac{1}{2}$	4·2	·952

MILKING COMPETITION AT NERANG.

The following is the result of the milking competition, held at Nerang Show, on 2nd September, 1898:—

MORNING.

Owner.	Name of Cow.	Pounds of Milk.	Percentage Butter Fat.	Commercial Butter.
Mr. Stanfield	Primrose ...	27	3·2	lb. ·967
	Purple ...	23½	3·8	·736
	Strawberry ...	21¼	3·9	·713
Mrs. Clare	Yellow Girl ...	22½	3·2	·806
Mr. Rudd	Blossom ...	19¼	3·4	·733

EVENING.

Mr. Stanfield	Primrose ...	12¼	4·2	·575
	Purple ...	14¼	3·6	·574
	Strawberry ...	9¾	4·6	·501
Mrs. Clare	Yellow Girl ...	12¼	4·4	·603

TOTAL (Morning and Evening) POUNDS OF COMMERCIAL BUTTER.

Primrose.	Purple.	Strawberry.	Yellow Girl.	Blossom.
·967	·736	·713	·806	·783
·575	·574	·501	·603	...
<u>1·542</u>	<u>1·310</u>	<u>1·214</u>	<u>1·409</u>	<u>·783</u>

CANADA AND THE DAIRYING INDUSTRY.

THE following circular has been issued by the Ontario Department of Agriculture:—

“In building up the dairy industry of Ontario two things have been taught and urged—namely, purity and high quality of products, and economy of production. Whatever set-backs this great industry may have met in the past few years can be traced to a neglect of one or other of these important points. The cheese industry of Ontario is now fairly well established, and the annual production of a large amount of well-made, whole milk cheese of uniform quality has given Canada a controlling influence in the British cheese market. Our creamery industry is now rapidly developing, and it is of vital importance that the strictest attention be paid to the turning out in an economical manner of butter of a uniformly high quality, pure and unadulterated. This industry will, if properly conducted, assume very large proportions, since the average consumption of butter is much greater than that of cheese, and the British imports of butter greatly exceed those of cheese. In the British market our butter meets in competition similar goods from Ireland, Denmark, France, the United States, Australia, and Argentina.

“Denmark has attained a chief place by studying the requirements of the market, and now produces nearly all of her creamery export butter from pasteurised milk or cream with the use of special ferments. In some of the countries exporting to Great Britain—Australia, in particular—it has become a practice to use some kind of ‘preservative’ in butter-making. Sometimes this is added to butter as a salt; sometimes it is added to the milk. These preservatives are sold under various names, such as preservallene, preservatine, preservitas being favourites. They are nearly all mixtures of *boracic acid*. The increasing use of these preservatives has alarmed the British consumer, and most radical measures are now proposed to exclude all butter in which

traces of these preservatives are found. The British public has become alarmed, the Press is actively discussing the matter, and public officials are now on the lookout for butter so adulterated. It must be carefully noted that all butter made from milk or cream to which anything but common salt has been added is adulterated.

“The butter-producers of Ontario must make no mistake. The use of any of these preservatives is dangerous to the dairy interests of this country. Everything possible should be done to discourage the use of such substances, and the Press should, as far as possible, prevent the advertising of them in this country. Ontario has a reputation for producing pure dairy goods of high quality. That reputation must be maintained, and every person interested in the dairy business of Ontario should assist in preventing these preservatives from getting a foothold in the province. ‘An ounce of preventive is worth a pound of cure.’ We have a reputation now for making pure butter and cheese. Help to maintain that reputation. Do not *advocate* preservatives. Do not *advertise* preservatives. Do not *use* preservatives.

“JOHN DRYDEN,

“Minister for Agriculture for Ontario.

“Toronto, 15th April, 1898.”

The above circular was printed in *Hoard's Dairyman* (the best-known dairy paper in America), and its contents were commended to the attention not only to the dairymen of the province of Ontario, but of dairymen *everywhere*.

A NEW PRESERVATIVE.

THERE are many old truisms written and spoken with respect to the preservation of butter. It is impossible to be always original. The greatest scientists in butter manufacture find difficulty in avoiding repeating themselves, and fault is often found with dairy experts that they say the same things over and over again. Perhaps they do. But “what for no?”

Every day fresh amateurs—aspiring dairymen—are coming into the field, and are anxious to hear what their forbears have heard many times, but which is new to them. Therefore let the dairy, butter, and cheese expert take heart of grace and continue to repeat himself. He is always sure of some in his audience to whom his instruction is of value.

When we come to “the latest,” we must naturally search the world for information; and however some may cavil at receiving a piece of news culled from another journal, it must be recollected that the journals, especially those devoted to agriculture, help each other. What is not seen or heard of in one district or country is common in another, and it is the duty of the agricultural journalist to disseminate new facts which have been derived from newspapers and periodicals, the very names of which are unknown to his subscribers. A valuable suggestion is valuable, whether it is original or taken at twentieth hand, if it has not before been suggested in the journalist's district.

Now here we have from a French source a proposition to introduce a new process by which butter can be preserved (so it is claimed) for a reasonable time, as fresh as the day it was put up. This is arrived at by the use of fluoride of sodium dissolved in water. The solution is colourless, odourless, absolutely harmless, and is a powerful antiseptic, and is composed of 20 parts by weight of the fluoride to 1,000 parts of water. Into this the fresh butter is placed and kneaded up. Then the blocks of butter are put into an airtight vessel, with a cover hermetically closing it, and a space is left over the butter to be filled up with a solution of 6 parts by weight of fluoride to 1,000 parts of water. When the cover is put on, the inventor says it will keep for years, and may be transported long distances in the hottest climate without

deterioration. When the butter is required for use, all that is needed is to work it thoroughly in fresh water, which removes the fluoride and gives it the quality and appearance of fresh butter.

Here is a very simple invention, but will anyone but the inventor try it? It seems worth a trial. Any idea which promises so much is worth a trial. It is no use being too conservative in these days.

Progress is what is wanted, and progress can only come by experiment. Failures are useful. They stimulate invention. When Beau Brummel achieved a sensational success in the ballroom by the marvellous necktie he wore, his valet retired down the backstairs with a basketful of ties, remarking, "These are our failures."

FRENCH DAIRIES.

In French dairy establishments there is no haphazard style of milking allowed. Certain rules are laid down, and these are rigidly enforced. A French journal publishes these rules, which are nine in number—

1. Work rapidly; slowness causes loss of cream.
2. Milk thoroughly to the last drop, because the last milk is the best.
3. Milk at the same time every day.
4. Milk crosswise—that is to say, one fore teat on the right hand and a hind teat on the left, and *vice versâ*; the milk thus flows more copiously than by parallel milking.
5. Milk with five fingers, and not with index and thumb, a fault too common with milkers.
6. Do not employ any kind of milking machines.
7. To milk young restive cows raise one of the fore feet. Never strike them.
8. Always keep the hands clean, and also the cows' udders and dairy utensils.
9. During milking avoid distracting or disturbing the cow.

Those who neglect any of these prescriptions invariably lose milk.

To these rules we will add a tenth one:—

Never smoke when milking. We have often seen a man milking and smoking at the same time. Tobacco-ash, and even tobacco itself, will fall from a pipe, and as it rests right over the bucket the ash must fall into the milk with evil results.

GOOD POINTS OF THE BEEF TYPE OF CATTLE.

"MARTIN'S Home and Farm" gives the points of the beef type of cattle from the point of view of an English agricultural journal. They are—First, the general beef form—low, broad, deep, smooth, and even, with parallel lines. No wedge-shape is wanted for the block. Next in importance is a thick, even covering of the right kind of meat in the parts that give the high-priced cuts. This is a very important factor in beef-cattle often overlooked. The high-priced cuts are the ribs and loins. Good, broad, well-covered backs and ribs are absolutely necessary to a good carcass of beef, and no other excellencies will compensate for the lack of this essential. It is necessary to breed for thickness in these parts. There is also a certain quality, character, and style necessary, and one of the first indications of this is found in the skin and coat. A good feeding animal will have soft, mellow touch, and fine but thick and heavy coat. A harsh, unyielding skin is an indication of a sluggish circulation and low digestive powers. A certain amount of bone is necessary, but coarse-boned, rough animals are almost always slow breeders.

STAMPING OUT TUBERCULOSIS.

FROM the American rural journals we learn that it has cost Massachusetts—the old Bay State—three-quarters of a million dollars during the past four years to endeavour to stamp out tuberculosis in cattle. The results have proved so poor that the Legislature this year has refused to appropriate further funds, and the work is being brought to a close. Farmers objected at first to the business, as they were only paid half value for the cattle destroyed by the State, but when full value was paid they co-operated heartily, and thus the policy has had a very fair trial. Out of 210,000 head 9,844 were suspected of tuberculosis, and only half of these (5,062) reacted. Thus only 2·4 per cent. of the cattle inspected proved to be diseased.

Since only 4 per cent. of the cattle condemned in 1897 proved to be badly diseased, while 33 per cent. of those condemned in 1895 were suffering from “general tuberculosis,” two things are evident (says the *Pacific Rural Press*): One, that the physical examination was very thorough in 1897; and, two, that badly diseased cattle had been about all destroyed by the work of the previous year. The largest number found to be generally tuberculous was 1,051 in 1896, or about one-half of 1 per cent. of all the cattle in the State.

It is stated that most of the slightly diseased cattle would recover under proper care, and that the carcasses would prove to be healthy food, and furthermore 96 per cent. of the cattle condemned in 1897 were but slightly diseased, and consequently might have been saved.

We are next given the cost of the work during four years. To weed out 2,500 badly diseased cattle, 10,000 which were but slightly affected had to be slaughtered, and all that was netted by the hides and carcasses was \$1 apiece. The whole business cost \$700,000 (about £140,000), or at the rate of \$28 (over £5 10s.) per head tested, and \$57 (£11 10s.) per head condemned. Nearly \$500,000 (£100,000) was for cattle killed, but the operating expenses \$220,000 (£44,000) averaged nearly \$9 (£1 17s. 6d.) per head tested, or \$18 (£3 15s.) per head killed. The cattle killed were worth \$33 (£6 17s. 6d.) apiece, so that half their value was expended in condemning them. Taken altogether, it was found that the cost of the whole work amounted to \$100 (£20) a head.

We now come to the conclusion drawn from an exhaustive report, which it is unnecessary to reproduce.

The first conclusion is that the Massachusetts system has almost exterminated the badly diseased cattle, but these at most constituted less than one-half of 1 per cent. of the total number in one year. The system then appears not to have materially reduced the proportion, slightly diseased, that react to tuberculin.

The second finding reads: To find and slaughter these badly diseased animals cost about \$100 per head, besides nearly \$500,000 paid to farmers for cattle killed.

Four out of every five killed were but slightly diseased, might have recovered, or were available as healthy meat.

Thirdly, we have a sweeping denunciation of the work as being a system “too utterly unscientific, too horribly extravagant, too outrageously wasteful, too senseless, and too impractical to ever be repeated.”

Coming to the fourth conclusion, we note that tuberculin evidently does not injure healthy cattle; it reveals the presence of tubercles, except in advanced cases, but is no measure of their extent. Whether it aids in curing mild cases or tends to render them malignant is not yet settled. To kill simply because a test reacts, is folly.

The *Orange Judd Farmer* in the fifth place says:—The positive failure of the radical method to accomplish the purpose sought lends added importance to the truth laid down by this journal when the radical policy was begun—that separation from the herd of animals suspected by either tuberculin or physical

test, ventilation, disinfection, good food, but not a forcing diet, pure water, are the practical means of combating consumption in cows. Common sense and sanitation will do the business. Education and agitation should be along these lines.

Lastly, in all these years the milk or beef from a tuberculous cow has never been positively proven to have been the direct cause of consumption in a single human being. While such danger exists, it has been grossly exaggerated, as shown by the widespread decrease in consumption coincident with a large increase in the *per capita* use of milk.

HINTS FOR CHEESEMAKERS.

HEATING MILK.

It is necessary, as a rule, to heat milk before renneting, unless, as in some cases, it happens it has not lost its natural heat. Milk, when drawn from the cow, has a temperature of 95 degrees F., but rapidly loses its heat on exposure to the atmosphere. When steam vats are employed in cheesemaking, the temperature of the milk is raised by its being surrounded by steam and hot water. Remember to well stir the milk to prevent fat rising to the surface, and also the bottom layer from scalding.

The old-fashioned way consists of withdrawing small portions of the milk, heating these, and returning until the right amount of heat is attained. Now, instead of doing this in such a haphazard way, it would be well for cheesemakers to follow a simple rule, which will give the exact number of degrees to which a small quantity must be heated to warm up the whole.

The rule is as follows:—Multiply the number of gallons of milk you are dealing with by the difference of its present temperature and the temperature required; dividing by the number of gallons of milk you intend heating; and, finally, add the resultant to the present temperature of the milk. This gives us the temperature to which the small quantity has to be heated to bring up the large quantity to the required pitch. Formulating this for simplicity, it would be:

$$\frac{\text{Number of gallons of milk} \times (\text{Required temp.} - \text{Present temp.})}{\text{Number of gallons heated.}} = \text{resultant} + \text{Present temperature.}$$

Take an example. Fourteen gallons of milk has at present a temperature of 82 degrees F., but we intend to rennet at 86 degrees F.

A difference of 4 degrees F. therefore exists. So that if we take out, say, three gallons to heat, to what temperature must it be brought to bring the fourteen gallons up to 86 degrees F.?

The above formula gives us the key-note.

$$\frac{14 \text{ gals.} \times 4^{\circ}}{3 \text{ gals.}} = 19^{\circ} + 82^{\circ} = 101^{\circ} \text{ F.}$$

So that the three gallons will have to be raised to 101 degrees F., which, when added to the rest, will give us fourteen gallons of a temperature of 86 degrees F.

Rennet is what is known as an unorganised ferment, sometimes termed a chemical ferment, and is found in the stomachs of most animals. Commercially it is usually extracted from the stomach of the calf, that is the head, or rennet stomach, where it exists in the cells of the lining membrane.

Some practical cheesemakers still make their own rennet by extracting calves' stomachs with salt, getting a resulting liquid which is unreliable for cheesemaking on account of its very varying strength, and its liability to decompose.

It is now inadvisable to prepare one's own rennet, as such good brands can be bought on the market, which are very uniform in strength, being always the same, and depreciating but little on keeping.

Rennet, in the form of tablets, is very useful in some cases. It is of a concentrated nature, and will keep much longer than liquid rennet. Never use bad-smelling rennet, as the cheese may be entirely ruined by doing so.

COAGULATION OF MILK.

The time taken to complete coagulation depends on the amount and strength of rennet used, and also upon the temperature at which renneting takes place. As a rule with most cheeses the time occupied is about forty minutes to an hour.

What takes place in coagulation is a separation of the milk constituents; the casein being turned by the rennet into an insoluble clot in the form of curd.

Milk may coagulate spontaneously, which is due to lactic acid. Now curd is the result in both cases, but these curds differ materially. The curd produced, when milk coagulates spontaneously, is of a greasy character, as no lime salts present in the milk are entangled. But in the case of "rennet curd," we have the difference in that it is elastic and not greasy, and practically the whole of the lime salts are entangled in this curd.

There are other differences in these two curds which do not affect the practical cheesemaker, and to which it is therefore unnecessary to refer.

WHEY.

In this substance we have a valuable pig food, its value chiefly depending upon the sugar and small amount of albuminous matter it contains.

Some feeders even prefer whey to separated milk as a pig food, although by its composition it appears not nearly so valuable as the latter. Meals of various kinds mix well with whey for pig-feeding. Whey should never look milky, or bad handling and rough treatment of the curd has usually taken place, the fat which ought to have been closely entangled in the curd having escaped and given the milky appearance to the whey.

SCALDING THE CURD.

In most cases, or the old way, part of the whey is taken out, heated, and returned to the vat, the temperature to which it must be heated not exceeding 130 degrees F.

We do not want to get the scald above 130 degrees F., as, if this is done, the latter ferment is interfered with, and the curd will not mature as quickly as required.

The three scalds adopted in Cheddar making are 110 degrees F., 120 degrees F., and 130 degrees F., so that we have to fix three points or temperatures in raising the temperature of the contents of the vat, and with these three scalds generally get it up.

For instance, the contents of the vat may be at 82 degrees F., and we want to scald it to 102 degrees F.

Then in this case let the first scald (*i.e.*, the 110 degrees F.) raise it from 80 degrees to 89 degrees F., the second from 89 degrees to 95 degrees F., and the third the remaining degrees from 95 degrees to 102 degrees F.

Of course, the numbers of gallons of whey employed in these scalds can be found by reversing the formula given for heating milk.

PRESSING.

After the various processes of ripening, salting, &c., of the curd have been gone through, we come to the press.

Not much is to be noted here except to use little pressure at first, or loss of fat will be experienced.

Slight pressure at first, and gradually increasing it to the amount required, is the best.

RIPENING CHEESE.

A great deal of the character of the cheese depends on the ripening process.

Sometimes we get filthy curd turning out into moderate cheese after three or four months' ripening.

As to what occurs in ripening it is difficult to say; the one chief feature is that insoluble curd is made soluble. If ripening goes on too long, we get a decomposition set in, and foreign substances are found which make old cheese sometimes a dangerous article of diet.

The great essentials of ripening are that the cheese shall be kept moist and warm, a temperature of about 60 degrees F. being suitable for most purposes.

During ripening a great loss of water takes place, and fat appears to accumulate, but this apparent formation of fat is due to loss of casein upon which chemical and bacteriological action takes place.

A separate room, where the temperature can be regulated, and where no draughts or bad smells are found, is necessary for ripening cheese to the best advantage.

Uniformity is to be aimed at in the production of cheese, when it is much more marketable.—*Farmer and Stockbreeder.*

Viticulture.

CELLAR WORK: FINING.

By E. H. RAINFORD,
Viticulturist.

FINING is an operation by which wine may be cleared of impurities, made bright and limpid, and a superabundance of tannin and colouring matter removed from it. Some people have an idea that it forms an unavoidable and necessary part of the treatment of wine in the cellar; that any wine that has not been fined should be looked upon as unfit for consumption and in danger of spoiling. This is a mistake; in many cases wine will benefit by fining, but there are also cases where it is quite unnecessary; and when fining is not required, it cannot do good and may do harm. Vignerons should not, therefore, blindly fine wines because it is supposed to be a necessary part of their treatment, but examine each and judge for themselves.

A wine which remains cloudy after the silent fermentation is over, and it has had its first racking, requires a light fining; also, a wine which, after being perfectly clear, becomes slightly cloudy. This means that fermentation of some kind is taking place which should be checked. It can generally be done by racking the wine into sulphur vapour, which paralyses the action of the ferment germs, and then fining it. In both cases the fining is necessary to remove from the wine the ferment germs or their *débris* which cause the cloudiness. Again, wines which from various causes have acquired an unfavourable taste, such as mouldiness, earthiness, taste of cask or lees, may often be improved by fining. A wine which is too astringent from having fermented too long in contact with the husks, or from too much stalk having been used in its manufacture, is

materially improved by fining. This latter class of wine would require several years to lose its astringency naturally, although, but for that defect, it might be in fit condition to be drunk; much time and expense would therefore be saved by giving it a properly proportioned fining, rendering it at once fit for consumption.

Fining is also employed to lessen the colour of wine, more particularly in white wines which are too dark. As the tannin and colouring matter in wine are intimately connected, any substance which acts upon, and removes part of, the tannin will also remove part of the colour matter.

On the other hand, if a wine is perfectly bright, sound, and of good taste and colour, it is a mistake to fine it. No good can be done to it by doing so; on the contrary, it may do it some harm. Always avoid adding anything to wine which is not necessary, as it must affect its natural qualities, no matter how slightly. Most finings being composed of albuminous matters, are prone to decomposition; and although the tannin is supposed to remove it all from the wine, some may remain in wines weak in tannin and prove eventually a source of danger to the wine. To tell if a wine is perfectly bright, a glass of it should be examined in front of a lighted candle in a dark part of the cellar, which will at once reveal any cloudiness or floating particles if the glass is slightly shaken. Should the wine under this test prove perfectly bright, and the flavour, colour, and proportion of tannin be all that is desired, then that wine requires no fining and should be rigorously left alone.

There are two classes of finings—those that act mechanically, and those that act chemically and mechanically. The former, which comprise kaolin, Spanish earth, and similar substances, are now seldom used; they are slow and uncertain in their action, are very liable to leave an earthy taste in the wine unless very carefully washed previously, and in some cases, having an alkaline reaction, they affect the acidity of the wine, which is to be avoided. The colour is also liable to be spoilt by the alum which some of these earths contain. For the above reasons, this class of fining should be avoided, but if any vigneron should wish to experiment with them let him first make a trial on a small amount of wine to see the effect.

Finings which act chemically and mechanically are blood, white of eggs, isinglass, and gelatine. On the addition of any of the above substances to wine, the tannic acid, which is the astringent principle of wine, combines chemically with the albumen, coagulating it, and as it is in a very finely divided state it slowly settles to the bottom of the cask, carrying with it, mechanically, all other impurities. The two first are generally used for red and the latter two for white wines.

RED WINES.

Blood should only be used for coarse red wines, abundant in colour and tannin, as it is liable to take away from the body of finer qualities, and leave them with a flat mawkish taste. Use only the blood of bullocks or sheep (the former is the better), which must be as *fresh* as possible; whip the blood whilst still warm with a small birch of twigs to remove the fibrin, which will rise to the top as a spongy mass, otherwise the blood on cooling will coagulate and not mix with the wine. The quantity to be used will depend on the quality of the wine, but for general purposes one tumblerful to every 20 gallons will be found sufficient. If the wine is very astringent, more can be put in; a little experience will soon teach the amount required. The blood should be first well mixed with a gallon of wine which is poured into the cask to be fined, and the whole well stirred with a fining-rod. A fining-rod can be made of any piece of hardwood, 4 feet long and about 2 inches square; the lower half being pierced through with a number of holes half-an-inch in diameter on both faces, the upper two feet being rounded for a handle.

White of egg is more generally used for red wines, especially for those of finer quality. Two eggs for every 20 gallons of wine will be found generally sufficient to fine most red wines, unless it is desired to take away a certain amount of colour and astringency, in which case more must be used. Beat up the whites of the eggs, which must be quite fresh, with a little salt in a basin or similar utensil, until all strings have disappeared, as can be proved with a fork, but avoid beating up too violently so as to make much froth. Beat in a little of the wine, added slowly, and then stir the contents of the basin into a couple of gallons of the wine to be fined, until well mixed and all froth has disappeared, and then pour the whole into the cask and stir well for a few minutes with the fining-rod.

WHITE WINES.

Isinglass is undoubtedly the best fining for white wines, but it is very expensive, and what is sold as isinglass is very seldom the real article. Vignerons are cautioned against purchasing a so-called isinglass having the appearance of long narrow strips of membrane. This is only a dried seaweed of a gelatinous nature, and has very little value as a wine-fining. It is throwing money away to purchase it. Most of the so-called isinglass sold is a fine-quality gelatine, which must not be confounded with the real article. If real isinglass can be procured, the dose is one-third of an ounce to every 100 gallons of wine; it must be shredded as finely as possible into a basin, and covered with water and left from twelve to twenty-four hours. At the end of this time it will have absorbed water and swollen considerably. Pour off the water, and work the isinglass with the fingers until all hard lumps have disappeared. Then add half-a-pint of boiling water, well stirring till the isinglass is dissolved. Dilute further with some of the wine to be fined, and then pour the whole into the cask, well mixing with the fining-rod as already explained.

Gelatine is by far the cheapest and easiest managed fining for white wine. It is met with in two forms—in brilliant transparent thin sheets, about 8 inches long by 3 broad; the best quality colourless, the inferior slightly yellow, and the same cut up into shreds more or less fine and put up in cardboard boxes. The substance sold as Nelson's isinglass is ordinary gelatine, and makes a very good fining, but the French gelatine in fine sheets is better and more economical.

An average amount for fining is from one-third to half-an-ounce for every 20 gallons. The shreds or sheets must be soaked in water in a pudding-basin until quite soft, without any hard or horny lumps—a quarter of an hour is usually long enough. Then pour off the water, draining it well, and immerse the basin in a pan or saucepan of hot water until all the gelatine has melted, which it will do in a minute or two. Stir in gradually some of the wine to be fined until the basin is nearly full, and then mix the contents with a gallon or two of the wine in any convenient receptacle, stirring it all the time. Then pour the whole into the cask and stir for some minutes. It is particularly recommended that the melted gelatine be not poured into the cask insufficiently diluted, as in cold weather, with the wine at a low temperature, the gelatine is liable to coagulate and fall to the bottom without acting on the wine. By well diluting the gelatine with wine, and continuing to stir whilst mixing, this danger will be avoided.

Milk.—Some writers advocate milk as a fining. Under no circumstances should sound wine be fined with this substance. It can be used for clearing vinegar—1 pint to each 20 gallons.

Many kinds of patent finings are advertised and pushed as being very efficacious and economical, but they are as a matter of fact only other forms of the finings above referred to. Those in form of powders are merely the albumen of blood or eggs dried and powdered. Those which are in a liquid state are solutions of gelatine cooked under pressure at a temperature of 250

degrees, which has the effect of preventing the solution solidifying when cool. By using fresh blood, eggs, &c., the vigneron knows that he is employing pure and sweet material, a fact of which he is not certain in the case of the patent articles; and as the vendors must make good profits, they will certainly not prove as economical.

If a wine is being fined to reduce colour and astringency, it is well to take a sample from the cask at the time, and run it through a filtering-paper in a small funnel to clear it. By doing so, it can be seen if the colour is correct or if more finings are required, which could be added at once.

All fined wines should be racked directly they are bright, especially in this climate, as there is a risk of the lees or deposit in the cask decomposing and communicating a bad taste to the wine. Even in cold weather a fortnight is quite long enough for the wine to stand before racking. For the same reason cold weather should be chosen for fining wine when possible.

ADDITION OF TANNIN TO WHITE WINES.

Before a white wine is fined, it is necessary to find out whether it contains sufficient tannin to allow of its being fined with isinglass or gelatine. As already explained, the tannin coagulates the albuminous substances, enabling them to act mechanically on the wine to purify and clear it. If there is insufficient tannin, the gelatine will, in part, remain dissolved in the wine and prove a source of considerable danger to it, and some white wines of the Chablis type are very deficient in tannin. To find out if a wine contains sufficient tannin to enable it to be fined, proceed as follows:—Prepare a very small amount of finings (as already explained, a few shreds of gelatine will do). Fill two tumblers of the wine to be fined, to one of which a grain or two of tannin dissolved in a little spirit of wine has been added. Fine both the tumblers with exactly the same amount of finings—say a very small teaspoonful. If there is no difference in the discolouration and subsequent deposit on the two wines, it contains sufficient tannin naturally; but if, on the contrary, the wine to which the tannin has been added gives a greater discolouration and deposit, the tannin is deficient, and must be supplemented. The test can also be made at the time of fining, by drawing off two tumblers of the cloudy, newly fined wine and adding to one some dissolved tannin, and watching the effect; if the wine proves deficient in tannin, it must be added without delay to precipitate the gelatine, which might, if left dissolved in the wine, cause alteration of its qualities.

The amount of tannin to be added to white wines will of course depend upon their deficiencies in that substance; an addition of half-an-ounce to each 20 gallons of wine should be sufficient for most wines. The tannin can be obtained at most druggists, and should be dissolved in the strongest spirit of wine procurable—4 oz. of tannin to 1 quart. An amount of spirit corresponding to the amount of tannin required should be measured off and well mixed with the wine to be fined.

Recollect that the colour of wine is invariably reduced by fining, so that the vigneron operating on a wine which will not bear much loss of colour should proceed cautiously.

Botany.

CONTRIBUTIONS TO THE FLORA OF QUEENSLAND.

By F. MANSON BAILEY, F.L.S.,
Colonial Botanist.

Order RUTACEÆ.

ASTEROLASIA, F. v. M.

A. woombye (n. sp.) A tall shrub, clothed in most parts with an elæagnoid indumentum. Leaves membranous, upper face glabrous, deep-green, the underside grey, with close, silvery, stellate scales, and scattered brown ones, linear, almost linear-lanceolate, $1\frac{1}{2}$ to $2\frac{3}{4}$ in. long, 3 or 4 lines broad, apex obtuse; petioles 2 or 3 lines, margins slightly repand, alternate, the two last ones close under the flower-head nearly opposite. Flowers 6 to 10 or more in heads or clusters at the ends of the branchlets. Primary peduncle very short or wanting, sometimes is seen a secondary peduncle bearing three flowers. Pedicels 3 or 4 lines long. Calyx-teeth triangular, the points sometimes elongated and recurved, $\frac{1}{2}$ to $\frac{3}{4}$ line long. Petals much imbricate in the lower part, valvate at the top, white with brown stellate scales on the back, the face glabrous, about 2 lines long. Stamens 10, filaments white, longer than the petals, filiform, glabrous or roughened by a few minute glands. Anthers oblong, yellow, $\frac{3}{4}$ -line long. Style thicker and shorter than the filaments, glabrous. Stigma scarcely lobed. Ovary very scaly, showing 5 cocci in the flowers examined.

Hab.: Woombye, North Coast Railway, *W. French*.

ACRONYCHIA, Forst.

A. Scortechinii (n. sp.) A small tree, the branchlets often of a reddish colour. Leaves obtuse-lanceolate, or obovate, subcoriaceous, 2 to 3 in. long; petioles about $\frac{1}{2}$ -in. long. Cymes axillary, few-flowered. Peduncle slender, about as long as the petioles; the three branches usually bearing 2 flowers at their extremities. Pedicels about $2\frac{1}{2}$ lines. Sepals very short, broad, glabrous. Petals $4\frac{1}{2}$ lines long, ciliate. Filaments dilated at the base, tapering upwards, margins densely ciliate except towards the top. Fruit globular, reddish, exceeding $\frac{1}{2}$ -in. diameter, 4-celled, with a juicy epicarp. Seeds oval, testa brown, slightly rugose.

Hab.: Borders of scrubs, Logan River, *Rev. B. Scortechini*; Fraser's Island, *Miss Lovell*. The fruit of this tree, which is of a sharp, pleasant acid taste and red colour, is useful for jam-making. The Logan River specimens I have referred to at times as a form of *A. acidula*, F. v. M., and the Fraser's Island ones as a form of *A. imperforata*, but now consider these two forms identical, and, although agreeing often somewhat in foliage and flowers, distinct from all others of the genus in fruit.

Order STACKHOUSIÆ.

STACKHOUSIA, Sm.

S. intermedia (n. sp.) An erect annual. Stem striate or sulcate, only a few inches high; branches few, terminating in rather long slender spikes of minute flowers. Leaves very narrow, $\frac{3}{4}$ to $1\frac{1}{4}$ in. long, margins revolute; apex shortly subulate, pointed. Flowers solitary or in twos or threes. Calyx-lobes about $\frac{1}{2}$ -line with acute points. Corolla-tube scarcely longer than the calyx-lobes; lobes spreading, narrow, long as the tube. Cocci tuberculose.

Hab.: On damp rocks, Lizard Island. The position of this species is between *S. muricata*, Lindl., and *S. viminea*, Sm. It was found in company with *Drosera indica*, Linn.; *Buchnera linearis*, R. Br.; and that curious rock-loving grass, *Diolachne loliiformis*, F. v. M.

Order APOCYNACEÆ.

CERBERA, Linn.

C. Odollam, Linn., var. *Mugfordi*. A small tree or large shrub. Peduncle terminal, often appearing lateral from growth of shoot, 2 to 5 in. long, then once or twice forked; the branches as long as the peduncle. Flowers rather large, white with a red centre, very fragrant. Fruit roundish-oval, somewhat compressed, $2\frac{1}{2}$ in. long, 2 in. broad, purplish-crimson when fully ripe.

Hab.: Mourilyan Harbour, near high-water mark, *Wm. Mugford*. I find nothing to separate this plant from what may be called the normal form without it is the colour of the fruit, in which respect it differs from all others of the genus except, judging from pl. 2968, Bot. Mag., of *C. Tanghin*, Hook.

CONTRIBUTIONS TO THE FLORA OF NEW GUINEA.

Continued from Vol. III., page 203.

By F. MANSON BAILEY, F.L.S.,
Colonial Botanist.

Order BURSERACEÆ.

BURSERA, Linn.

B. Macgregorii (n. sp.) (After Sir William Macgregor, K.C.M.G.) Tree of medium size, the branchlets covered with prominent resinous lenticels. Leaves alternate, pinnate, mostly of 5 leaflets; leaflets oblong-lanceolate, $1\frac{1}{2}$ to 2 in. long, 1 in. broad, subcoriaceous, petiolules 4 to 6 lines long, petiole 1 to $1\frac{1}{2}$ in. long. Inflorescence short, slender panicles in the axils of the upper leaves of the branchlets. Flowers minute, white, pedicels about as long as the flowers. Calyx-lobes very minute, orbicular. Petals 6, twice as large as the calyx-lobes. Stamens 12, shorter than the petals, filaments flattened, anthers triangular. Ovary crowned by a 5-lobed, sessile, stellate stigma. Fruit (unripe) entire, globular, or almost didymous.

Hab.: Taupota, British New Guinea. I have but a single specimen, which was collected by Sir William Macgregor, and given to me while on board the "Merrie England," May, 1898.

Order MELIACEÆ.

VAVÆA, Benth.

(From *Varas*, the name of one species at the Friendly Islands, *Benth.*)
(Plate LIII.)

V. papuana (n. sp.) A tree of medium size, the branchlets with prominent lenticels. Leaves opposite or alternate, crowded at the ends of the flowering branches, resembling in this some species of *Terminalia*, oblong-lanceolate, 7 to 9 in. long, and from 3 to 4 in. broad about the middle; petioles very short. Peduncles terminal on the lateral branches, 4 or less together, about $1\frac{1}{2}$ in. long, rather slender, each bearing 5 or 6 flowers at the end. Calyx-tube about $1\frac{1}{2}$ line, teeth 4, blunt, shorter than the tube. Petals white, 4, linear, ligulate, exceeding 2 in. in length, about $2\frac{1}{2}$ lines broad. Stamens 12, monadelphous, the tube about 1 in. long, split for some distance down one side, the inside slightly hairy and with a band of glands at the base, free portion of filaments nearly as long as the tube. Anthers somewhat lunate, narrow, versatile. Style slender, long as the stamens, glabrous except for a few short strigose hairs towards the base. Stigma capitate, 4-angled. Ovary tomentose, small, 12-ribbed, with a purple dot at the bottom of each, 4-celled. Fruit globose, the only one obtained immature.

Hab.: Small bay, foot of Mount Trafalgar. A showy plant well worthy of cultivation, the rather large clusters of white flowers forming a striking contrast with the dark-green foliage.

Also from the same locality specimens were obtained of the Scitamineous plant—*Clinogyne grandis*, Benth. The specimens were poor, but seemed to favour *C. grandis* rather than *C. dichotoma*, Salisb.

Plate LIIT.



J.C. Mills

VAVÆA PAPUANA, Bail.

Order SAPINDACEÆ.

NEPHELIUM, Linn.

N. Winterianum (n. sp.) (After the Hon. F. P. Winter, C.M.G.) A tall shrub or small tree. Leaves pinnate; leaflets irregular, probably usually 4, opposite or alternate glabrous, 3 to 4 in. long, sessile or tapering at the base into a short petiolule, oblong or oblong-lanceolate, sometimes forming an elongated blunt apex, underside pale, margins entire. Panicle axillary or lateral, racemose, branching from near the base, these lower branches often much longer than the rest of the panicle, branches bearing small clusters of 2 or more pedicellate, small, white flowers. Calyx minute. Petals with scales on face near the base. The fertile stamens 8, twice as long as the petals, filaments hairy at the base. Staminodia with orange-coloured sterile anthers. The fertile stamens arranged on one side of the flower; the staminodia on the other, or the flowers unisexual; the male with an abortive ovary and the female with abortive anthers. Hypogynous scales glabrous, obtuse. Ovary shortly stipitate, prominently 3-winged; style rather long, flattened, stigma shortly lobed.

Hab. : Bay, foot of Mount Trafalgar.

Order ARALIACEÆ.

MERYTA, Forst.

M. colorata (n. sp.) A tall succulent shrub attaining 8 or more feet in height; the whole plant more or less clothed with somewhat pungent deciduous hairs. Leaves alternate, the lower ones more than 2 ft. long and 6 in. broad, lanceolate in outline, margins much undulate and often broken, lateral nerves prominent, parallel with thinner cross reticulations, colour somewhat dark-purple; petioles very stout, about 6 in. long; the leaves on the upper part of the plant near the inflorescence much smaller on shorter petioles. Flowers in terminal panicles, probably becoming lateral by the growth of the terminal shoot. Peduncle about $1\frac{1}{2}$ in. long; branches dichotomous, purple, bearing small sessile clusters of small flowers. Calyx 4-lobed. Petals 0. Stamens 4, filaments broad, spreading. Anthers large, white, 2-celled. Ovary sessile, depressed, somewhat 4-angled. No fruit obtained.

Hab. : Gira River, New Guinea.

Order RUBIACEÆ.

IXORA, Linn.

I. timorensis, *Dene.*; var. A tall shrub or small tree, the branches more or less flattened at the ends. Leaves oblong, thin, coriaceous, 6 to 12 in. long, 2 to 4 in. broad, tapering to the base and apex. Petioles short and stout, glabrous on both sides, the parallel nerves and reticulations fine. Stipules fugaceous, only seen near the ends of the branches, shortly connate within the petioles, short, very obtuse with flattened cusps. Inflorescence in terminal trichotomous panicles, the common peduncle very short; but the two lowest branches, which start from its base, sometimes being absent, it appears then to be long, owing to the great distance to the next pair of branches. Flowers white, often stained with pink, on short slender pedicels. Calyx minute. Corolla-tube slender, hairy inside; lobes 4, linear, about 3 lines long. Stamens 4, inserted at the orifice of the corolla-tube; filaments glabrous, short. Anthers twice as long as the filaments, twisted, basal lobes prominent. Style slender, hairy, except near the top and bottom. Fruit not seen.

Hab. : Margin of small bay, foot of Mount Trafalgar, New Guinea.

Economic Botany.

INDIGENOUS "RUBBER" PLANT (*Excæcaria Dallachyana*, Baill.).

By F. MANSON BAILEY, F.L.S.,
Colonial Botanist.

THIS small tree, which for years past has enjoyed the reputation of causing the deaths of stock, especially from browsing upon the young shoots which spring from old stumps on land recently cleared, is now likely to prove of some value as a "rubber" producer. A couple of months ago I received a small bottle of the milky juice of this tree from Mr. F. W. Peek, secretary of the Logan Farmers' Association, Ferndale, Loganholme, who stated that "it was very abundant, and the sample sent had been obtained by simply tapping the tree with a few cuts of a tomahawk." To some specimens of this plant in my herbarium, which were collected by Mr. Charles Moore, late Director of the Sydney Botanic Gardens, is attached the following note:—"The bark of this tree, when cut, exudes a white viscid very poisonous juice in such quantities that at least a gallon might be collected in a few minutes from one tree. The juice appears to have all the properties of Indiarubber or guttapercha. Of so virulent a nature is this when fresh that the aborigines will not even touch it." Being anxious to have this milky sap tested for "rubber," I handed the sample to Mr. J. C. Brünnich, chemist to the Department, and he has kindly furnished me with the report which I attach hereto.

Excæcaria Dallachyana, Baillon, the scrub poison-tree, is a small, rather graceful tree, which is frequently met with in the coast and river scrubs. The foliage is of a dark-green, and often dense. Leaves from 1 to 3 inches long, ovate-lanceolate or oval, obtusely acuminate, bluntly toothed on the margins. The flowers small, and, as will be seen by the accompanying plate, the sexes are separated. I am glad of the opportunity of again drawing attention to the fact of there being rubber-bearing plants among the Queensland vegetation, several of which might probably be worthy of cultivation for that product. If the rubber from the plant in question proves of sufficient value, it would be one of the easiest to obtain and cultivate either north or south of Brisbane.

We have two other species of the genus *Excæcaria* indigenous to Queensland—namely, *E. Agallocha*, Linn. (the River Poison-tree or Milky Mangrove), and *E. parvifolia*, Muell. Arg. (the guttapercha of the Gulf country). The former is also a native of India, where, according to Drury, the milky juice which it exudes is called "Tiger's Milk." The natives are afraid almost to cut the branches for fear of the milk blistering the skin, or causing blindness should it by chance get into the eyes. A good kind of caoutchouc may also be prepared from the milk.

The other species—*E. parvifolia*—is abundant about the Gulf of Carpentaria, and, besides yielding a "rubber," furnishes a most beautiful wood suitable for the cabinetmaker.

LETTER FROM MR. J. C. BRÜNNICH.

To F. M. Bailey, Colonial Botanist.

SIR,—I have the honour to send you herewith the result of the analysis of the milk of *Excæcaria Dallachyana* which I received from you. I also send you a small quantity of the caoutchouc-resin obtained from the milk. I could not detect any toxic principles.

I have, &c.,

J. C. BRÜNNICH, Agricultural Chemist.

Gatton, 2nd September, 1898.



EXCÆCARIA DALLACHYANA, Baill.

1. Male. 2. Female.

ANALYSIS OF MILKY JUICE FROM *EXCAECARIA DALLACHYANA*.

The juice received for analysis has been kept for some time, was slightly decomposed, having a strong smell and slight acid reaction.

Specific gravity at 15° C. = 1.0578.

The milk contained:	Water	...	...	...	...	= 61.65 per cent.
	{ Soluble in Naphtha: <i>Caoutchouc</i> , &c.					= 19.61 "
Total Solids:	{ " Ether: resins					= .58 "
36.34 per cent.	{ " Alcohol: tannin, &c.					= 5.52 "
Ash:	{ " Water: Potash salts and					
1.57 per cent.	{ organic acids					= 4.07 "
	{ Insoluble in water: <i>Albuminoids</i>					= 6.54 "
	{ Undetermined and Loss					= 2.03 "
						100.00 "

REMARKS.—The milk could not be coagulated by leaving it exposed to the air, adding water, salt, or sal-ammonia solution. When heating and evaporating a yellow sticky mass, soon becoming browner when exposed to the air, which had the properties of true caoutchouc.

I may add that in many places where caoutchouc is produced certain trees (*Kickxia* and *Landolphia*) produce milk which does not coagulate, but does so readily and produces an excellent caoutchouc when mixed with the milk from trees of other species.

J. C. BRÜNNICH, Agricultural Chemist.

Popular Botany.

OUR BOTANIC GARDENS.

No. 7.

BY PHILIP MAC MAHON,
Curator.

CLOSE by the position where we left off in our last chat you will note representatives of a somewhat peculiar group of plants. These are the Macrozamia, Cycads, and Zamias, representing the order of plants known to botanists as Cycadaceæ. They are only found in Australia and South America, but at one period in the history of this earth of ours they formed a very large proportion of its vegetation. A glance at the history of the advent of the different forms of vegetable life will prove interesting, and we may learn from it to view the great divisions of the Vegetable Kingdom with a new, more comprehensive, and more intelligent interest.

First, the earth was "without form and void," and in the rocks of that far-away time there is found no trace of life, no tracing of leaf or stem, nor track of bird or lizard. "Darkness was upon the face of the deep."

A little time passed—some few millions of years; a mere raindrop in the ocean of Eternity—and then, to use the words of the most beautiful of Records, "The Spirit of God moved on the face of the waters." Here in the limestone we first find life—tiny plants, nematophytes and rhizocarps, the mere beginning of organised plants, consisting mainly of single or slightly branched cells, flowerless, and living in the water. The animals of the time were what are called zoophytes. They had no eyes; they were not required, for it was still dark. But the fiat went forth, "Let there be light," and then in the rocks we begin to find relics of animals, allied to our lobsters, with eyes; and a little later two families of light-loving plants began

to appear—Equisetaceæ, represented by the common mare's-tail of the British marshes, but now nearly vanished from the face of the earth, and the Lycopods or club mosses, of which there are several in Queensland, but very degenerate in size when compared with their gigantic progenitors. Then came the Conifers, and about the same time the Ferns; for at this time it was said, "Let the dry land appear." With the club mosses came the earliest fishes—strange, armour-protected creatures—and with the Conifers (our Araucarias are of that ilk) came insects. "Let the earth bring forth grass, the herb yielding seed, and the fruit-tree yielding fruit after his kind, whose seed is in itself, upon the earth." You will note that each successive step is in the direction of a higher and more complex organisation.

This brings us up to the time of the Coal Measures, when the whole surface of the earth, even to the poles, was like one gigantic hothouse reeking with moisture, steaming with heat, saturated with carbonic acid gas. These plants grew as they never grew before, nor since. Gigantic club-mosses, with whose scientific names you need not be troubled, choked every part of the dark steaming earth. We are burning these very club-mosses in our engines and factories to-day. Every time you throw a lump of coal on the fire you are handling a piece of fern, or club-moss, or mare's-tail, or Conifer, which grew in the day when "the moving creature that hath life," the gigantic frog-like Batrachians first crashed through the forests of ferns, mosses, and Cycads. For this is the point at which our friends the Cycads first came in. A little later the ferns, mare's-tails, and club-mosses began to wane in numbers. The earth was getting cooler. But the Cycads and Conifers multiplied, and very soon had divided between them the sovereignty of nearly the whole vegetable kingdom. About this time, about half-way up in the coal formations, we meet a new and higher development, the Monocotyledon—the class to which grasses, bamboos, and lilies belong; and a little later, keeping pace with the progress in the world of plants, came crocodile-like reptiles, the marsupials, forefathers of our kangaroos, and birds, "every winged fowl after his kind."

Then there was a long pause. The earlier forms of plant life had become of comparatively small account, the ferns had become fewer in number and less in stature, the gigantic mare's-tails had passed away, the club mosses had dwindled to their present dimensions; the Cycads were passing away—they no longer formed as formerly the bulk of the forests even in what is now Great Britain; the Conifers had taken their place in the scheme of vegetable life and now formed the bulk of the plant world; but the higher forms, the grass-like plants, were quickly increasing and soon took the lead. A whole cycle passed away, and then we first meet with faint indications of still higher forms, the Dicotyledons, closely allied to the trees which now form the bulk of our vegetation. A little time after these appeared came mammals, "the beast of the earth and cattle." One type, you see, kept pace with the others, and the animal and vegetable worlds ran neck-and-neck in the race for perfection. The Conifers slowly decreased, the grasses and lilies very slowly became fewer and smaller, though they still hold their own. The Dicotyledons increased; and then came Man, to "have dominion over the fish of the sea, and over the fowl of the air, and over the cattle, and over all the earth."

This is the position now. The earlier types—the Rhizocarps—have served their purpose, and are of small account; the middle types are almost gone, the lovely ferns holding out the best; the Conifers are in an inferior position; and the two later types—the endogens and exogens—hold divided empire, the latter (being the later form) preponderating. Will there be other types, and what will they be like?

It is not easy to tell the story of the Creation of the vegetable world in a few hundred words. It has never been better told than on the first page of the Book quoted. To those who object that this has little to do with the economic aspects of horticulture, let it be answered that a comprehensive grasp of the vegetable creation has much indeed to do with that feeling which translates work into worship and patient striving into pleasure, and that this feeling means success in anything a man puts his hand to.

The order of the appearance of the plants and animals has been as follows:—1. One-celled water plants, very simple Rhizocarps, &c. 2. Zoophytes, sea animals of simple structure, eyeless. 3. Molluscs. 4. Crustaceans, lobster-like animals with eyes. 5. Mare's-tails, curiously jointed plants, leafless. 6. Club mosses, or Lycopodiums. 7. Fishes. 8. Conifers, like our Araucarias. 9. Insects. 10. Ferns. 11. Cycads, like those before you. 12. Batrachians, huge frog-like animals. 13. Grasses, &c.; Endogens. 14. Saurian lizards. 15. Birds. 16. Marsupials, like our kangaroo. 17. Exogens, like our present forest trees. 18. Mammals, such as cattle, &c. 19. Man.

You see that progression is the keynote of Nature, and if you would succeed in your garden you must march to the same tune.

There is a demand in Europe for the dried leaves of *Macrozamia*. Messrs. T. Seibt and Becker, Berlin S., Germany, use them, and would, no doubt, be prepared to quote prices to anyone who could furnish a supply, and as one at least of the species is believed to produce ricketts in cattle they would not be missed by stockowners.

To the left there is a curious plant which possesses considerable interest for us, as being one of the aboriginal food plants. It is closely allied to the Taro, which forms such an important article of diet in many tropical countries, and of which we shall meet with plants by-and-by. This plant is generally known by the natives as Cunjevoi, and by such name is often spoken of by whites. Its large rhizome, well developed in the specimen before you, is the part used, and is possessed of a highly acrid principle when raw, and is in that state decidedly dangerous, but when well cooked it is nutritious. Care must be taken that all the acrid principle is dissipated by heat. The huge leaning rhizome, a sort of compromise between root and stem, has tubers below the ground, and these the native splits open and roasts in the ashes of his fire, according to Thozet. They are then broken in a rude stone mortar, and again roasted and pounded into a rough flour, and then formed into cakes which are carefully baked in the ashes, and again pounded and baked until the acrid principle is driven off by repeated bakings.

It is said that if a piece of the lower part of the fresh stem be rubbed on the part of the body stung by the Stinging-tree (*Laportea gigas*), immediate relief will be experienced.

The writer, last week, was where acres of Stinging-tree and Cunjevoi were growing, and, as he had never experienced the sting of the former, he wanted to try the experiment, but was begged by a very experienced bushman not to do so, as he had tried and found the remedy quite useless, but said he: "A man can become inoculated with the poison, as is the case with my brother, who suffered greatly at first, but is now proof against it." My informant is Mr. Rose, junr., of Woombye, who is one of the best woodsmen I have had the luck to meet.

You know the beautiful rice paper upon which the Chinese artist produces his coloured drawings often microscopic in their fidelity to nature. That plant with the rather woolly fan-like leaves is the one which produces it. It is known as the Rice-paper Plant (*Aralia papyrifera*). It is a good plant to grow, for its very beautiful flowers, like sprays of white coral, come on at a time of year when there is usually a great dearth of flowers of any sort. It does well at the borders of shrubberies, and suits well in a large garden. It sends underground, however, long roots from which suckers spring up, and thus, in small gardens, it is sometimes found difficult to keep it in bounds. As, however, it will not cross a belt of other shrubs, a place can be found for it with the exercise of a little ingenuity. You will see close by, standing alone, and one mass of pendant white flowers now (August 15th), a dark-leaved small tree. This is a rather conspicuous object standing alone, with the kiosk in the background. It is the Queensland Nut (*Macadamia ternifolia*), and gives promise of a brave crop of nuts this season. It would pay to plant a good grove of these trees. It should be done in rich soil, alluvial being preferable. The nuts have a beautiful flavour, and are, moreover, very nutritious, and there would

be no difficulty in placing them on the market, if available in sufficient quantity. The hanging bunches or racemes of white flowers are really beautiful, and, if you take one and look into it, you will note it has a form similar to the flowers of the silky oak. And, indeed, it is a very near relative to that sturdy tree. It belongs to the curious order *Proteaceæ*, which is so largely represented in our Queensland flora, there being no less than nineteen genera of them, divided into seventy-two species.

The kiosk, where refreshments are daintily served on small tables out of doors, is a most prettily designed building, and is frequented by hundreds of people, especially on Saturdays and Sundays, when those who are not members of the "Gigocracy," and have no vehicle with which to escape into the country, can wander at their ease amongst beautiful surroundings undisturbed by noise and dust, of which they hear and see more than sufficient all the week. Of this privilege those whom circumstances or want of circumstances or preference incline to walk rather than to drive, avail themselves every Sunday literally by the thousand.

Have you ever seen Bunya-trees in bloom? The chances are that you might visit the Gardens for many a day and never notice that they have flowers. You know, of course, the cones which come down about Christmas time with such a thud, but you have not perhaps noted the brown male catkins which you will find very conspicuous on many of the trees if you take the trouble to look for them. Our friend the Bunya loves the society of his own kind. It is his nature to have his lower branches suppressed, and to shoot up aloft in search of light and air, and to make a "stick" which will delight the heart of the timber-getter. So when he is planted out as an ornamental tree he gets on all right for about thirty years, and then he seems to wonder why the other trees are not shouldering him and forcing him upwards; his lower branches, which in the forest would disappear, become scraggy, and those at the top seem to be doing all the work, and thriving. Finally, after some years, the Bunya finds that he cannot get along under the wholly unnatural conditions in which man has placed him; so he gives up the fight in disgust, and dies. In his native forest he produces fine timber, often most prettily grained and veined. It has the additional recommendation that it can be worked with great facility. In the good old days of the early settlers, when a man could take his chance between bushrangers, cannibal blacks, and other choice products, the Bunya-trees were the property of certain tribes of blacks. But all the other tribes liked the Bunya-nuts, which made them very fat. So they repaired to the capitalistic tribes, who welcomed them with open arms. Eating the Bunya-nuts set up an intense desire for animal food; so some of the visiting tribe were generally pressed to stay when the time for departure came, and so affectionately did their hosts regard them that they ate them. To the left is the shade garden, the recesses of which we will explore next month.

Horticulture.

NOTES ON SCENT-YIELDING PLANTS.

By NAT. SINE.

ROSE.—This delightful perfume is procured from several species of rose, but most commonly from the *Rosa centifolia provincialis* and *damascena*.

Chemically speaking, otto or attar of roses is a mixture of two bodies—one, a solid non-odorous, white stearoptene, melting at 95 degrees F., and boiling at 300 degrees F., constituting from 7 to 14 per cent. of the whole; the other, the odorous portion, being a yellowish liquid hydrocarbon of undetermined constitution. The stearoptene is readily soluble in the liquid portion, from which it may easily be separated by cooling.

The rose is extensively cultivated in Turkey, Bulgaria, Roumelia, and France; the three firstnamed countries producing the distilled otto or attar of roses, and the lastnamed mostly producing the fine rose pomade by the maceration process.

In 1887 Bulgaria produced 57,868 oz. of otto of roses, valued at, when pure, from 25s. to 30s. per oz.

In the year 1888 Roumelia produced 90,752 oz. of otto of roses, so that the rose farms in that country may be said to represent an annual value of from £113,000 to £136,000. As the present value of otto of roses is about 40s. per oz., these figures are subject to enlargement.

At Adrianople, in Turkey, some 12,000 to 14,000 acres are under roses, supplying the most important source of wealth in the district.

An average crop generally returns about £15 per acre, clear of all expenses, and in a favourable season this return may reach as high as £25.

Otto of roses is largely adulterated by the addition of geranium oil, the presence of which is easily discovered from the brownish tint, resulting from the addition of a little iodine.

The distilling apparatus used in Bulgaria is a very simple affair, consisting of an elongated copper boiler, in the shape of a truncated cone, surmounted by a narrower neck, upon which is fitted a peculiar dome-shaped head, having very much the appearance of a half-opened mushroom. Into this head is fitted a straight tin condensing tube at an angle of about 45 degrees with the vertical. This tube passes through a cask, into which a supply of cool water is admitted to effect condensation. No worm or coil is used as in an ordinary still. The peculiar dome-shaped head of the still probably allows of the use of such a restricted cooling tube, as the steam passing through the narrow neck of the boiler would, on entering the head, expand a good deal, and, by so doing, be more readily condensed.

The capacity of the still is generally 24 gallons, and each charge consists of 22 lb. of roses to 16½ gallons of water.

The still is generally placed on a built furnace of brick or stone, fitted with a central chamber and flue to carry off smoke. When distilling, the water in the boiler is brought rapidly to boiling point, the temperature being then carefully moderated and regulated by withdrawing the long pieces of wood used for fuel. The operation lasts about an hour and a-half, and is stopped when 9 quarts of liquid have been collected in the receiving vessel. The still is then recharged after being emptied of its contents, the refuse water being set aside to cool for use a second time. The product of four first distillations is returned to the still, and from the 9 gallons, only 9 pints are drawn off and put on one side to cool, when the oil separates from the water and is drawn off.

In France the rose is cultivated in a very simple manner. The land is manured and ploughed, rooted rose plants being placed in the ground at distances of 2 feet apart and 5 feet from row to row. Each root before planting is cut back to two or three buds. In the fourth year the plants are fully developed, and when well cared for last about seven years. In an average season the product of an acre is about 2 tons of flowers, valued at from 3d. to 6d. per lb. It requires about 10 lb. of roses to perfume 1 lb. of fat by the maceration process.

ROSEMARY (*Rosmarinus officinalis*).—Rosemary is cultivated to a small extent in Surrey, the general treatment of the plant being much the same as for lavender.

The oil exists mostly in the leaf of the plant, and but little in the flower.

This plant is of slower growth than lavender, and takes longer to arrive at a stage fit for reaping.

On distillation of the fresh herb a thin limpid oil is obtained having the characteristic aromatic odour of the plant.

One cwt. of fresh herb yields about 24 oz. of oil, valued at about 30s. per lb.

Oil of English-grown rosemary is worth about ten times as much as that produced in Germany, France, and Spain. In the last-named country rosemary is found growing wild and covering large areas of land.

Oil of rosemary is extensively used in perfumery, especially in combination with other oils for scenting soaps; it is also used largely in the manufacture of Eau-de-Cologne.

Rosemary grows well in the cooler parts of Southern Queensland, and strikes almost as readily from cuttings or slips as geranium.

Like the rest of the "herb" tribe, it likes a deep loamy soil and a sunny aspect.

It has a tendency to "squat," so might be grown with advantage in continuous hedge rows, about 4 feet apart, which would allow of horse cultivation.

RUE.—This plant yields, upon distillation, a quantity of oil much used in the manufacture of toilet and aromatic vinegars.

One cwt. of plants yields about 10 oz. of oil, worth about 7s. per lb.

Rue is largely used in a dry state for medicinal purposes, and would pay if grown on a fairly extensive scale.

SAGE.—A very pleasant-smelling oil can be obtained by distillation of any of the *Salviæ*. That obtained from the common sage is very valuable, in combination with other oils, for scenting soaps. The oil, when pure, is worth about 12s. per lb.

Sage grows well in parts of Queensland, but does not like much heat. It is easily propagated from cuttings, and if planted about 15 to 18 inches each way will soon cover the intervening spaces and keep down weeds.

The dried leaves find a ready sale for flavouring purposes, but the price offered will hardly admit of hand-stripping. Two or three cuttings may be obtained in the year under favourable conditions.

TANSY (*Tanacetum vulgare*).—A very strong-smelling oil is obtained from this plant on distillation, which can scarcely be called a perfume, as most people describe its odour as "a horrible smell." In spite of this drawback it is very valuable and sells readily at about 30s. per lb.

This plant grows well in the cooler parts of the colony, and in some deserted gardens may be found holding its own amongst buffalo and couch grass, which speaks well for its hardy character.

THYME (*Thymus vulgaris*).—All the different species of thyme, but more particularly the Lemon Thyme (*Thymus Scopyllum*), yield by distillation very fragrant oils, which are extensively used for scenting soaps, for which purpose they are best suited, as they impart a herby rather than flowery scent to both grease and spirit. When dried and ground, however, these herbs are much used in the manufacture of sachet powders.

If given the same treatment as sage or marjoram, this plant will do well, as it stands a good deal of heat.

One cwt. of dried herb yields about 10 oz. of oil, that obtained from the "white" thyme being more valuable than the oil produced by the "red." Along with other culinary herbs this plant is imported in a dry state for flavouring purposes, being largely used in the butchering trade.

TUBEROSE (*Polianthes tuberosa*).—One of the most delightful scents used in perfumery is procured from the tuberose by placing the freshly gathered flowers on thin layers of cold purified fat spread on glass held in frames similar to an ordinary window-sash, but so constructed that the glass can be taken out and the fat removed.

It takes 3 lb. of flowers to perfume 1 lb. of fat, the freshly gathered flowers being worth about 2s. per lb., and the scented fat about 12s. per lb.

The tuberose requires a fair amount of moisture and much the same treatment as other bulbous plants, but will not stand frost. The bulbs are generally planted from 9 to 12 inches apart, with a space of 2 feet between each row. In suitable soil and climate a plantation will generally last about eight years. An acre will produce about 9 cwt. of flowers.

In the south of France the annual production of tuberose flowers reaches the extraordinary weight of about 220,000 lb.

VIRBENA (*Aloysia citriodora*).—From the lemon-scented verbena a very fine oil is procured by distillation with water, which, however, has not the refined and delicate perfume of the fresh leaves of the plant.

Lemon verbena is cultivated to some extent at Valencia, in Spain, where the plant grows to great perfection.

The plant yields a quantity of oil worth from 22s. to 24s. per lb., and is easily propagated from cuttings.

If well pruned, the bushes will throw out numerous shoots, making the reaping an easy matter. Planted not less than 3 feet by 5 feet would allow of horse cultivation.

A few concluding remarks for and against scent-farming may be of some slight use to intending growers.

There appear to be two great objections to scent-farming in Queensland at present: One, the lack of cheap labour for the picking of flowers in localities best suited to their growth; the other, the tendency of perfumed fats to become rancid. The former may be overcome in time by increased settlement, and the latter by combining olive-oil production with perfume-farming, and macerating the fresh flowers in the oil instead of prepared fat.

Until these difficulties disappear, intending growers might turn their attention to the raising and distilling of such crops as can be treated in a wholesale manner, where the whole plant is reaped and distilled—as, for instance, peppermint, patchouli, lavender, rosemary, geranium, mint, sage, marjoram, thyme, tansy, rue, and lemon-scented verbena.

There is no doubt that in certain favoured localities, where soil and climate are suitable, scent-farming will pay well and enable settlers to make comfortable homes on land that the ordinary corn and potato man could not exist on for a year.

There is always a demand for essential oils and perfumed fats in the south of France, so exporters of those products, if treated by the English dealer in an unfair manner, could very soon put matters on a satisfactory footing by shipping produce to some of the French dealers in Marseilles.

GROWING ROSES ON BARREN SOIL.

By H. W. GORRIE,
Government Horticulturist.

MANY lovers of flowers would like to grow a few roses to beautify their homes, but are prevented from attempting to do so by reason of the poverty and barrenness of the soil available. Now, almost any kind of soil can be made to grow roses, and good roses, by taking some pains and preparing it properly before planting.

Roses like a somewhat stiff soil with a little clay in it, and the very poorest of soil can be made good enough for these beautiful flowers by the method described below.

The soil should be trenched to a depth of two feet, and in the bottom of each trench six inches of good coarse stockyard or stable manure should be placed. Then fill in six inches of soil, and on top of this another layer of manure six inches deep.

Six inches more of the soil can then be added, and on top of this a layer of well-rotted manure, or vegetable mould if procurable. Then fill in the rest of the soil, and allow it to lie for a month or so before planting.

When planting the roses, work a handful of bonedust into the bottom of each hole, set the plants firmly in the ground, water well if the soil is dry, and then mulch each plant with three inches of coarse manure.

If it is too much of an undertaking to trench the whole of the garden in this way, holes may be dug out where each rose is to go, and filled in in exactly the same manner.

The most unpromising soils treated in this way will grow excellent roses, and the trouble and labour expended will be well repaid by the profusion of beautiful blooms which the plants will yield during the summer.

Next month I will have something to say on how to treat the roses after planting, in order to keep them in the best of health and to ensure a continuous supply of flowers.

JADOO FIBRE.

UNDER this singular name a new and wonderful plant food was introduced last year by Mr. W. R. Virgoe, proprietor of the Old Chatsworth Nursery at Brighton, near Melbourne. To judge by the encomiums passed on the article by many leading horticulturists and fruitgrowers in the colonies, in England, and in America, it would appear that Jadoo, both in the form of fibre and as a liquid fertiliser, is worthy of attention. Neither of these can be called a manure. They do not "force" anything, but induce a wonderful growth of "fibrous roots," which enable the plant to absorb so much more nourishment that it grows quicker and stronger, and healthier in every way, than it can possibly do in soil alone. The fibre is imported in bales containing six bushels each, hydraulically compressed into a space of 5 cubic feet. For use, the fibre must be thoroughly disintegrated by rubbing it on a washboard or between the hands. When required for open ground for trees, plants, vines, &c., or for potting plants, it should be moistened with water until a bushel weighs about 35 lb. For potting plants, pots should be used two sizes smaller than is required for soil, and then proceed exactly as with soil, but pot more firmly in all cases. If Jadoo and soil are used together, then a pot one size smaller may be used. It must then be thoroughly watered.

When sowing seeds, rough portions of Jadoo are placed over the usual crocks, and the pot is then filled up with fibre pressed firmly and thoroughly watered. The seed is then sown thinly and covered to about its own depth with a little silver sand. After-watering must not be overdone. When Jadoo and soil are used together, they must be thoroughly mixed. To apply the fibre to old vines, the earth is scraped away as near the principal roots as possible, and the Jadoo is placed about 6 inches below the surface and covered with earth. The object of this is to cause fresh roots to form *in* the Jadoo. It is most important that the fibre be moist. In planting out young vines, a gallon of Jadoo fibre is used both above and below the roots. Jadoo liquid, diluted 20 to 1, helps on the crop greatly, if given when vines are first "breaking" and when the fruit begins to colour.

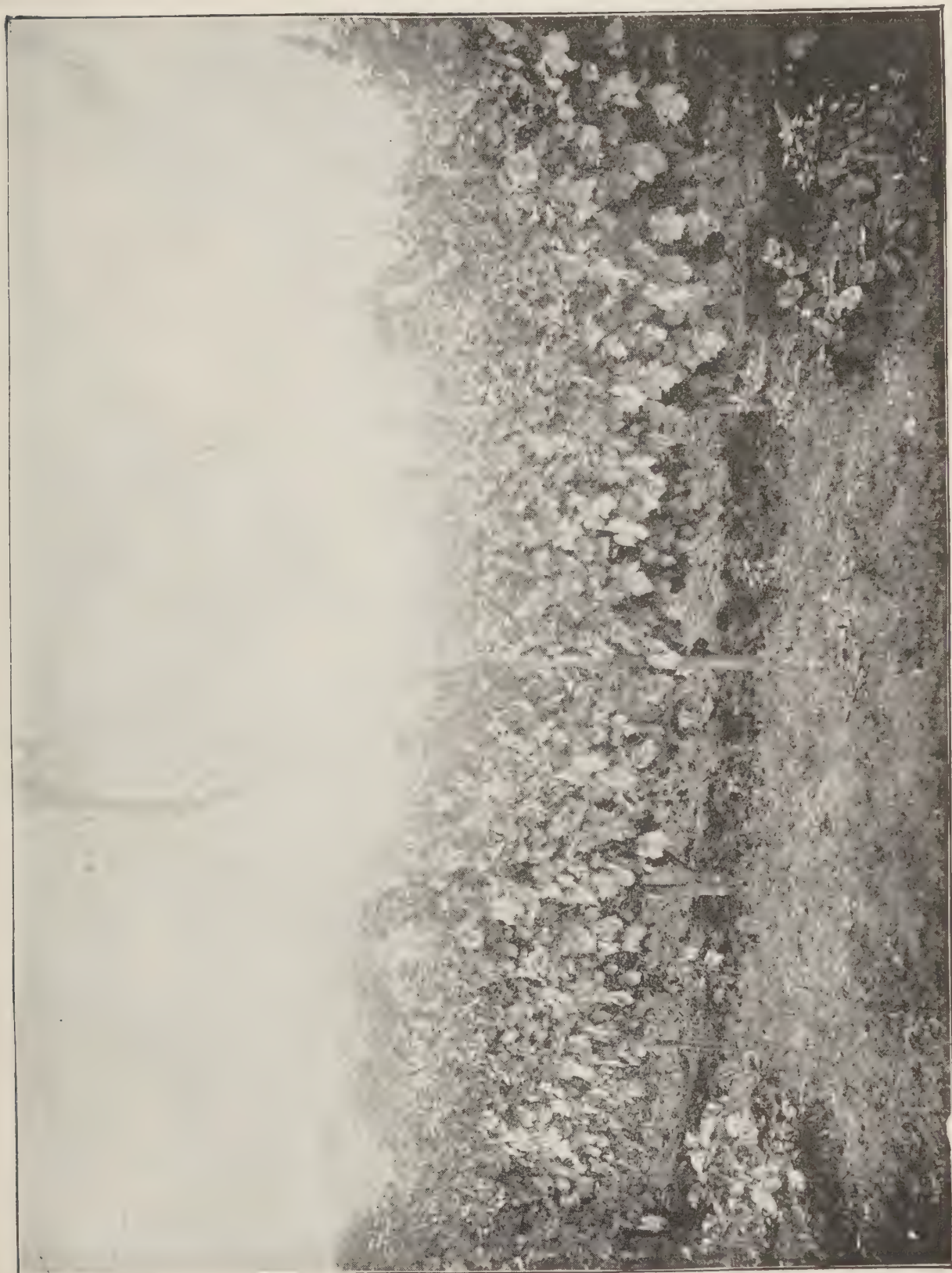
If Jadoo is placed in the furrow in which vegetable seeds are sown, it is claimed that the crop will come to maturity at least a fortnight sooner than usual.

Potatoes are early matured by placing them in 2 inches of fibre.

In the *Gardener's Chronicle* it is stated that some potatoes were grown in Colonel Halford Thompson's garden at Eastcliffe, Teignmouth, England, which had been grown in Jadoo fibre. The sets were planted over a thin layer of Jadoo, and about 2 or 3 inches over and around them. They were then covered with earth in the usual manner. The crop yielded 5 lb. 2 oz. per plant, being in the proportion of 22 tons to 25 tons per acre of marketable tubers.

Plate LV.

Vines grown Without Jadco on the property of Mme. Meran, Domaine de Gayet,
St. Androny, near Blaye, France.

Plate LVI.

Vines Grown With Jadoo on the property of Mme. Meran, Domayne de Gayet,
St. Androny, near Blaye, France.

Jadoo can be used many times over; in fact, it has not yet been ascertained when it becomes exhausted. This is a great point in its favour, and tends materially to reduce its original cost. When taken from a pot, all that is necessary is to spread out the fibre in a box and expose it to the air for a few days to sweeten it; then water it with liquid Jadoo at a strength of 1 in 20 of water until sufficient moisture has been absorbed to restore it to its original weight (about 35 lb. per bushel). It may then be used as at first.

What Jadoo really is, we know no more than the reader. We merely make mention of it, as we do of many new ideas, in the hope that some enterprising person will make experiments for the benefit of others.

Tropical Industries.

GROWING AND SEPARATION OF FIBRE, NORTH QUEENSLAND.

By E. COWLEY,
Manager, State Nursery, Kamerunga.

Fourcroya gigantea and *Agave sisalana* have been treated of in preceding articles. These plants were introduced for their fibre-producing qualities; but there are a number of introduced and indigenous fibre plants that flourish most abundantly, and often harmfully, in Queensland. Doubtless members of town councils and divisional boards are at their wits' end to know what to do in regard to the so-called Chinese Burr (*Triumfetta pilosa*) and *Urena lobata*, both of which are said to have been introduced by the Chinese, or, at all events, from China. This, however, does not seem to be the truth. Our Colonial Botanist, in his Catalogue of Queensland Plants, mentions five varieties of *Triumfetta*, only one of which (*Triumfetta rhomboidea*) has been introduced, and which Mr. Bailey says was probably introduced by the Chinese.

Urena lobata, the other burr, bears a pink flower, and, according to Mr. Bailey, appears to be indigenous. It is mentioned in the Dictionary of Gardening as "inhabiting the tropical regions of both hemispheres."

Each of the above plants produces abundance of good fibre. Specimens may be seen in the Museum of the Department of Agriculture, Brisbane. In places where these plants have become such a pest—as in the Cairns and Barron Divisional Board domains—it would surely be wise to get a machine, and make what is at present a source of real vexation and distress to the residents of these divisions into a marketable commodity, thus relieving the ratepayers, and probably adding a nice sum to the divisional revenue.

As it is, the probable cost of a machine would not be more than the present mode of cutting down the plants *after they have seeded*, and burning them off. It is presumed that after a few years both *Triumfetta pilosa* and *Urena lobata* will die out after having exhausted their required elements from the soil.

From a fibre-extractor's point of view, both these plants produce excellent long stalks, suitable for easy manipulation.

The natural order Malvaceæ gives a number of fibre plants, among which is the well-known *Sida rhombifolia* or *retusa*. It has been a question as to whether this plant is indigenous to Queensland or not. The name *Sida* was used by Theophrastus for the waterlily. It is a genus comprising a large number of herb shrubs. About eight inhabit the warmer parts of Africa and Asia, thirteen are indigenous to Australia, and the rest are American. *Sida retusa* is undoubtedly a pest, especially if it gets a foothold in pasture lands.

In agricultural areas it will not stand the plough, and is therefore not worse than many less valuable weeds. The only way to keep it out of pasturage is to pull each individual plant out by the root *before* seeding, and burn. If taken in time the destruction is easily accomplished, but, if allowed to overrun, this desideratum can only be obtained by ploughing and reploughing the whole. Grass land badly affected by *Sida* should be cropped for a year or two with some crop wherein agricultural implements can be used. *Sida* is not absolutely useless for pasturage, for in time of drought (withstood by this plant) cattle eat the tops of the branches, notwithstanding it is somewhat indigestible.

In regard to its fibre-producing capabilities, and the value of the fibre, the following may be of service:—

For proper cultivation a fairly good soil is required. The land should be ploughed and prepared carefully before the seed is planted. The season for planting will vary in different parts of the colony, but any observant farmer knows when *Sida* first shows in his district. Plant the seed thickly in lands about 6 feet broad, leaving trenches between. The fibre is best when the plant begins to bloom. The object of planting the seed thickly is to cause an erect growth for some 2 feet 6 inches to 3 feet without branches. When fit for fibre, the plants should be pulled up by the roots, tied in bundles, and placed in water to rot for six or eight days. The fibre is immediately on the outside, and, when properly rotted, can be peeled off as easily as a ripe banana. The upper portion of the root is left on, when the fibre is required for some purposes. The fibre is then hung to dry (in the shade is best).

Good prices may be obtained for *Sida* fibre, as will be seen by the following letter in regard to some specimens sent to Scotland, and separated by the writer. Extract from letter from W. H. Norrie, of C. Norrie and Co., Dundee, addressed to his brother in Queensland:—

"*Sida retusa* is a very fine fibre indeed, much too good and costly, I expect, for Dundee. The larger sample you were to send has not yet come to hand, but, so far as I and others can judge, it would not do for the Belfast wet-spinning. It does not draw like flax, and when wet it comes off in short flakes, as you can try for yourself. . . . In this district I think it would only come in to make white goods, as the bleaching and waste would be saved. For that I reckon it would be worth £40 or £50 per ton, but there are other purposes in which it would be of more value—such as mixing among spun-silk alpacas, besides a great many small purposes, dolls' hair, &c., which in the lump amount to many tons—hundreds even. . . . I do not think any mechanical process would give the same beautiful shine and colour that your sample has."

This letter was written before there was any thought of war between America and Spain, and the markets were then in a normal condition. A form of *Sida* weed has for the past few years taken the place of *Sida rhombifolia*; in fact, it seems to have driven it out of several Northern districts. It has lanceolate leaves, and is of a somewhat lighter colour. It being more branched in habit, it probably would not do for fibre purposes so well as *Sida rhombifolia*. The local name for it is *Sida acuminatifolia*. It is equally as bad as *rhombifolia* in pasturage, and the stock do not seem to eat it so readily as the latter in time of drought. Except when the soil is loose, it is somewhat difficult to pull any of the *Sidas* up by the root. In Fiji the Fijian employés were engaged during wet weather in pulling up this weed out of pasturage. They used long pointed sticks to loosen the earth around the roots. At Kamerunga a fibre has also been separated from *Hibiscus sabdariffa*, *Musa Banksii*, *Bauhinia*, *Pineapple Leaf*, *Abutilon perisflocifolium* (the latter an imported *Abutilon* from South America), and *Bæhemera nivea*. The cost of separation by hand is, however, very great. Beautiful, although short, fibre may be extracted from the pineapple leaf. It seems valuable for some purpose in the world's manufactories, though seldom noticed in price lists from Great Britain. The Chinese use great quantities of this. In Queensland it is a waste product where large

areas of pineapples are grown solely for the fruit. A trial to increase the value of the crop by extracting the fibre might be made. "*Bœhemeria nivea* (the Ramie or Rhea) is indigenous to South Asia, and extends as far east as Japan. It forms the strong and beautiful fibre woven into fabric which is inappropriately called Grass Cloth."—*Von Mueller*.

For many years trials with newly invented appliances for separating its valuable fibre have been made; but perfection does not seem to have crowned the efforts up to the present. The plant does well in North Queensland; but it requires rich soil, and would require considerable attention on a farm. A ton of rhea or ramie branches is said to yield 150 lb. of fibre. There can be little doubt that rhea is one of the strongest, if not the strongest, vegetable fibre known. The fabrics made from it wear to an extraordinary extent. It is said to be largely mixed with silk. Dr. Royle mentions that it has realised at times £120 per ton. The following is extracted from the *Produce World* of 3rd June:—

"The subjoined trials with respect to ramie may prove useful to such of our readers as are interested in making its cultivation commercially successful. It grows luxuriantly throughout nearly the whole of the tropics, and especially within 10 degrees of the equator, where there is a moist climate and very little variation in the temperature or in the rainfall throughout the year—the Straits Settlements and the surrounding countries, for example. In such a climate, the stems can be cut day by day, as they gradually mature, and thus the factory is kept fully employed throughout the year, necessitating only a small treating plant. The crop system, hitherto adopted, requires an enormous amount of machinery to deal with—say, the crop of 1,200 acres within a limited time—irrespective of the difficulties of getting labour. On an estate of, say, 1,200 acres, we advocate the laying out of three-acre blocks, two acres of which are under cultivation, and the remaining acre devoted to paths. One coolie can attend to each block, as, when once started, he has only to cut a daily supply of stems, no cultivation being necessary beyond returning to the land the refuse, consisting of the leaves (which are stripped off when the stem is cut) and the ashes from the burnt refuse from the decorticators. The daily cuttings, assuming a crop of 70 tons of stems per annum per acre, would be about 9 cwt. for each 2 acres. Assuming the stems to mature in three months, the block would be planted in twelve sections, occupying twelve weeks, and by the time the last section was planted the first should be ready for cutting. Each section will require weeding until the stems are about 2 feet high. After that no weeding will be necessary, as no weeds can grow in the neighbourhood of ramie, after the plant has attained that height. If regularly cut, the plants will grow for an indefinite period; but in consequence of the spreading of the roots they will require periodical thinning out—removing every other one, for instance—care being taken to have other land ready to transplant the roots to, so as to prevent waste. Irrespective of other considerations, the system of daily cutting is important, inasmuch as only ripe stems are cut and a uniform quality of fibre assured, whereas by the crop system ripe, overripe, and immature stalks are cut indiscriminately, thus preventing any possibility of uniformity in the fibre."

The above extract should convince Queenslanders that the cultivation of ramie is hardly practicable in North Queensland. The difficulty of labour and the unsuitability of the climate would condemn the idea in right-thinking minds. Perhaps the following should be included in this article:—Extract from a letter by Mr. Gollan, Superintendent of Government Botanical Gardens, Saharanpore: "It is simply folly to think of growing the plant for profit in the comparatively dry districts of Northern India. I believe it could be grown with profit in warm, moist districts in Assam, in some parts of Bengal, and in some of the southern and western parts of India; but in Northern India the climate is too hot and dry during the hot months and too cold during the cool months for the plant to wane freely. Our only crop, which is worthy the name, is the

monsoon crop, and it, at its best, is light compared with what the plant is capable of producing in districts with a warm, moist, equable, tropical climate."

It is just possible that in some parts lying between Mourilyan and the Mulgrave, rhea could be grown, as the climatic conditions there approach those of some of the districts mentioned by the writers quoted, with perhaps the difference that the thermometer at times recedes to 43 degrees F.

Trials for fibre could be reasonably made with the plants known to thrive with us. These have been noticed in this and foregoing articles, but the subject should not be finished without giving a few hints to prospective fibre-growers:— Be very careful and keep all the butts of your fibres at one end. Bale them in uniform lengths and colours. It is better to have one bale of discoloured fibre than a bale of discoloured fibre scattered through a consignment. You may be sure that the merchants or brokers at the market end will grade your article from the lowest standard; so keep it high. Mark all your best goods *as best*, and your lower quality as your lower. Act faithfully in this way, and your *brand* will soon become known and trusted. Consign your goods to a well-known broker who will do his best. London is the best market for fibre of all grades.

COFFEE-PICKING AT CAIRNS.

WE have received from Mr. E. Cowley, Manager of the State Nursery at Kamerunga, Cairns district, the final results of the coffee-picking on Hambledon Plantation in that district by aborigines from the Yarrabah Mission at Cairns Inlet, which is under the charge of the Rev. E. R. Gribble. By an error, the mission station was previously stated to be situated at Nyola.

The picking was continued during June, July, and up to the 5th August, with the following daily results:—

Date.	Result.	Boys Working.	Date.	Result.	Boys Working.
1898.			1898.		
July—	lb. oz.		July—	lb. oz.	
1	781 4	10	21	628 9	8
2 Saturday ...	402 8	10	22	529 11	9
4	663 12	10	23 Saturday ...	240 2	8
5	571 12	10	25	536 12	8 M. 7 A.
6	528 8	10	26	480 4	8
7	518 8	10	27	557 15	10
8	423 12	8	28	614 7	9
9 Saturday ...	233 1	9 (wet)	29	896 15	9 M. 8 A.
11	579 2	8	30 Saturday ...	536 12	9
12	536 12	9			
13	593 4	9	August—		
14	658	9	1	755 11	9
15	593 4	9	2	875 12	10
16 Saturday ...	353 2	9	3	536 12	9 M. 10 A.
18	461 5	7	4	494 6	9 M. 8 A.
19	548 10	8	5	444 15	10
20	607 10	9			

The price agreed on for the work was fixed at 3 lb. of coffee for 1d., and Mr. Gribble states that this price paid the pickers well.

The total crop gathered amounted to 25,741 lb. 12 oz., for picking which £35 15s. was paid to the natives.

Excluding Sundays, Saturdays ($\frac{1}{2}$ days), and wet spells, there would then be an average of about 10 boys per day in the field for about 40 days, who earned 1s. 9d. a day each. In the last (August) number of this *Journal* we showed that, according to the statistics furnished us by Mr. Cowley in connection with this aboriginal labour, the cost of picking 18,015 lb. of cherry would amount to £37 10s. 7 $\frac{1}{2}$ d., and that this quantity at the rate of 5 lb. of cherry

to 1 lb. of clean coffee would yield 3,603 lb. of clean coffee per acre. The total result as given above shows an average of a little over 64 lb. of cherry picked daily by each labourer, giving, as stated, a daily wage of 1s. 9½d. per man, or 10s. 8d. per week.

NOTES ON GINGER-GROWING.

THE *Journal of the Jamaica Agricultural Society* publishes extracts from a pamphlet by Mr. J. B. Kilmer, of New Brunswick, N.J., on the subject of ginger cultivation in Jamaica.

As we have amongst us some agriculturists who have turned their attention to this crop, it will be of advantage to them to glean from Mr. Kilmer's experience some valuable facts relating to the methods employed in that island in planting and preparing ginger for the market by the small settlers in the ginger-producing districts.

One of the essential requirements for the growth of this plant is—sunshine. Another requisite is moisture. [These we have in abundance in Eastern Queensland.—Ed. *Q.A.J.*]

The underlying soil (in the ginger districts of Jamaica) is white and yellow limestone, with trappean formation. This is covered in some of the nooks or valleys with a pulverent mould or loam deposit several feet in depth. The plant grows luxuriantly in such soil, but will apparently not thrive in marshy soil, nor where there is present more than 10 to 20 per cent. of clay or 30 per cent. of sand.

The Government returns for the whole island give only about 250 acres devoted to ginger. This amount of acreage would not give the amount harvested. But the real cultivation is not in acres, many cultivators having beds varying from 6 feet square up to the size of a building lot. A few cultivate from one to six acres. Large lots are very rare.

From 25,000 to 50,000 of the people of Jamaica are more or less dependent on the ginger crop for such ready money as is essential to maintain their existence.

The ginger planter divides ginger into "blue" and "yellow" from the colour of the rhizome. These are also known respectively as "turmeric" and "flint." The root of the blue is hard and fibrous, and less valuable commercially.

There is also a division into "plant" and "ratoon" ginger. The latter is a product of laziness, and is a return crop secured by leaving a part of the "hand" containing a bud in the ground. Ratoon ginger is smaller in size of hands than the planted, and loses each year in flavour.

GINGER-PLANTING.

Ginger is planted during October and November (in Queensland). The process differs little from potato-planting. Each finger containing an "eye" or embryo is planted in trenches or holes a few inches below the surface, and about a foot apart. The growing plant needs plenty of sun, and weeds must be kept down. The plant grows to a height of 4 or 5 feet. Its cone-topped flower-stems reach from 6 to 12 inches.

On wet soil, and during very rainy seasons, the root is subject to what is termed "black rotten." The root fills with water, swells in spots, turns black, and emits an offensive odour. In this condition it is attacked by insects and worms, which has given rise to the belief among planters that the rotting is caused by a so-called ginger worm. (It is possibly a fungus disease.)

Growing ginger must be well watered. An all-important feature is the rapid impoverishment of the soil that follows the ginger culture. The soil which produces the very highest quality of ginger—realising, perhaps, £10 per cwt. in the London markets—is the very deep, black soil of virgin forest.

Ginger can be and is grown in many places year after year on the same ground. When the soil becomes too poor to grow "white ginger," the "blue ginger" (the inferior variety) can be grown.

More depends on the curing of ginger than on the soil. Regularly shaped "hands" command the highest price in the market.

GATHERING THE CROP.

The ratoon ginger is gathered (in Queensland) from October to July, but planted ginger is not ready for digging until July or August, and from then till October is the "ginger season."

Ginger is known to be ready for harvest when the stalk withers. This begins shortly after the bloom departs. The rhizomes are twisted out of the ground with a fork. In this operation every bruise or injury to the hands is detrimental to market value.

The hands are thrown in heaps, the fibrous roots are broken off, and the soil and adherent matter removed. This must be done quickly after removal from the earth, for, should the ginger be dried with the soil and roots still adhering, the product would not be white; and if it lies in heaps before drying, it will mould. The custom is to throw it immediately into a dish of water; it is then ready for the uncoating or peeling operation. This is done by hand.

PEELING GINGER.

Ginger-peeling is an art. The ginger-knife is simply a narrow-edged blade riveted to a handle. In large operations the expert peels between the fingers of the "hands." Examination of a transverse section of ginger will show the importance of the operation. There is an outer striated skin, under which there are numerous layers of very thin-walled cork cells. These layers contain numerous oil cells, the oil cells being most numerous at the bud points. The oil contained in these cells, in specimens fresh from the ground, is almost colourless, very pungent, and exceedingly aromatic. It becomes yellow very quickly on exposure to the air, and even upon drying without removing the epidermis its delicate aroma is found to be fleeting. On drying the ginger the contents of these cells appear as a yellow, pitchy mass. (It has been stated that this colouring matter is identical with that of Curcuma.) As this cork layer is the seat of the greatest amount of oil and resin cells, it will readily be seen that the deeper the peeling, so much the more of these substances will be carried away with the epidermis, and more cells opened from which these principles may exude.*

As fast as peeled, the roots are thrown into water and washed. The purer the water, and the more freely it is used, the whiter will be the product. Generally a very little water washes a great deal of ginger. The hands are peeled during the day, and allowed to remain in the water overnight. This water acquires a slimy feeling, and, if concentrated, becomes mucilaginous and acquires a warm and aromatic taste. The natives claim that this process soaks out the "fire and poison" from very hot ginger. I placed some pieces in a stream of running water for twelve hours, and succeeded in making them several shades lighter in colour. The sample proved to be less pungent to the taste, and it is quite possible the force of the water carried away some portion of the aromatic principles. A few planters use limejuice in the wash water. This gives a whiter root, having some solvent action on the colouring matter; but, as the limejuice contains saccharine and pectose matter, it prevents drying, and mildew follows. In another experiment I supplied the natives with citric acid, vinegar, and acetic acid. They all worked fairly well, citric acid being the best whitening agent, but it was reported that the process was expensive and troublesome.

* The Jamaica Agricultural Society has advertised in the United States and in England the desirability of a machine or apparatus to be used in removing the coating from ginger; experiments along the line are now being made.—Ed. *Q.A.J.*

It is generally stated that ginger is deprived of its coat by being plunged into boiling water before being scraped. This practice is not used to any extent in Jamaica. Its effect is to swell the starch and bassorin-like gums. I found that after keeping the freshly peeled root-stalks in boiling water for an hour they were suddenly swollen, and the steam was filled with the aroma of ginger. Under this treatment the coating comes off easily, but, if the action of the boiling water is prolonged, the starch and fibre are acted upon, the product dries hard, and the colour is darkened. In fact, what is known as "black ginger" of the market is the result of this process. Ginger is found in the market coated with calcareous matter, such as carbonate of lime, &c.; this is said to be to fill a demand for "white ginger." Such a proceeding is apparently unknown among the planters. Well-cured ginger has a decided white coating, and that is all they know about it. It has been stated that it is a common practice to bleach ginger with the fumes of chlorine or sulphurous acid. It may be done in the other parts of the world, but no instance of it is known in Jamaica.*

I tried chlorine gas as a bleaching agent, but at best the product was of a dirty yellow colour. By using the fumes of burning sulphur, the whole being partially enclosed in glass, the heat of the sun aiding in the experiment, the ginger was whitened, and mildew prevented. I found, on trial, that it might be of service to place the ginger in a weak solution of chloride of lime before drying; this would aid in bleaching, and prevent mould.

CURING GINGER.

After washing, the process of drying follows. The tropical sun is the drying agent in all cases. Large operators have what is called a "barbecue." This is a piece of ground several feet square, bevelled off and laid with stone, and the whole coated with cement. It is placed so as to receive the greatest amount of sunshine. The small planter uses what is called a "mat," consisting of sticks driven into the ground, sawbuck fashion, and across these sticks are laid boards, palm, banana or other large leaves; oftener than otherwise the place for drying is a few palm-leaves spread on the ground.

Careful handlers put their ginger out as the sun rises, and turn it over at mid-day, taking it in at sundown. Rainy or cloudy weather invites mildew. It requires six to eight days for the root to become thoroughly dry. I made several tests to ascertain the loss in weight by drying in the sun, and found the average to be nearly 70 per cent.

Ginger dried in the sun for the market examined for moisture gave the following results:—

Six samples well-dried specimens showed a further loss when dried at 100 degrees C. as follows: 7-2, 8-5, 8-9, 9-5, 10, 11, 12 per cent.

Several poorly dried specimens, some of which were damp and mouldy, gave from 15 to 25 per cent. moisture when dried at 100 degrees C. During the progress of my attention to this subject, several attempts were made to utilise artificial heat in drying ginger. Such a course would, in some respects, be a very desirable one.

In a portion of the island given almost entirely to the cultivation of this product, a few years ago a wet season prevailed. It was impossible to dry the crop in the sun; as a consequence there was a loss of the crop, followed by a considerable distress among the planters.

During my observations an attempt was first made to dry without removal of the skin coat. This, if successful, would have meant the saving of considerable labour. The product was quite dark, the flavour not as good as that of the sun-dried. By removing a part of the coat the drying was hastened. Dr. A. G. McCatty, a practising physician and owner of a plantation, at my suggestion, placed in operation an American fruit evaporator. It was

* Bleaching by chemicals and coating with powders are market processes unknown to the planters.

necessary to use wood as a source of heat, and, partly owing to the high temperature and partly from the ignorance of the operator, the product so far has been rather poor in quality, the colour many shades darker, much of the aroma was lost, and a smoky, burned flavour acquired. Other planters are trying the process on this year's crop.

A curious incident resulted during these experiments. The natives, through prejudice against innovations, boycotted the drying apparatus, and refused to furnish supplies at any price. Experiments were made with calcium chloride as a drying agent. The result did not equal samples produced by the native method of drying in the sun. Attempts made to dry the ginger after first slicing, as might be expected, resulted in great loss of flavour and pungency. My conclusions were that, when well conducted, the native method of careful peeling and curing in the sun would produce a handsomer and a better product than any process yet suggested.

These observations were not undertaken with a view of making any complete analysis, and it was found that a microscopic examination by expert judges was far more reliable than any assay that could be made with the limited facilities present in the ginger-fields. A few such examinations were made as follows:—

Ethereal Extract.—Exhaustion of the ginger with ether in a Soxhlet extraction apparatus. The resultant extract, after evaporation of the ether, was dried over sulphuric acid to remove moisture. From this extract the volatile oil was calculated by the loss on drying the ethereal extract at 110 degrees C. for three hours. The only results from this process that seemed to be of value was that the finer grades, when carefully dried, contained a higher percentage of volatile oil.

Ginger dried, without removing the peel, gave somewhat higher results as to volatile oils than the peeled. The loss of this constituent was greater in a product dried by artificial heat, than when dried by sun. The amount of volatile oil found by aforesaid process was:—Lowest, 1 per cent.; highest, 3.20 per cent. The results as to ethereal extract, exclusive of volatile oil or of alcoholic extract from the ether-exhausted residue, seemed to be of little value, the different specimens giving such greatly changing amounts as to afford no guide.

The ruling price in Kingston and Montego Bay, for the heap, is 1½d. (about 3 cents). Heaps purchased by me varied according to quality, but the average weight was from one quarter to half a pound.

The buyers of ginger for shipping are expert and accurate. They grade, sort, and price, with a quick eye and ready touch gained by years of practice. The highest grades are large-sized hands of light and uniform colour, free from evidence of mildew. This grade is brittle and cracks easily, but broken pieces depreciate the value. Buyers also require the hands and fingers to be firm and full, without wrinkles or spots. They generally assort into four or five grades, that which is shrivelled and small being the lowest. The dark varieties form another; the heavy, tough, and flinty, a third. These four are finally assorted by placing hands which are small, but of good texture and colour, as one grade; the larger-sized, well-bleached hands into the highest grades.

The ratoon ginger sorts generally bring the lowest price, as they are small, soft, and soggy, and lack flavour. Ginger gathered green shrivels much in drying, and is less aromatic and pungent than when fully matured. Ginger that has mildewed is spotted, and the mildew starts a decomposition that affects the flavour. Ginger put in bags or laid away before being thoroughly dried will mould and acquire a musty odour and flavour, which it is impossible to remove.

The largest-sized hands are carefully selected by buyers and shipped to special markets, usually to England. I noticed hands weighing as much as 8 oz.; many of them weighing from 4 oz. upwards.

Ginger is packed in barrels for shipment.

My convictions are strong that the study of drugs should begin in their habitat and extend to the bedside of the patient. That it is important to know every change that may take place in their cultivation and collection, as well as those incident to their preparation for administration, this seems to be sufficient warrant for these observations taken in the Land of Ginger—Jamaica.*

COFFEE NOTES.

MR. J. WILSON, formerly a member of the Planters' Association of Ceylon, furnishes the following notes on coffee-planting in that island and in Queensland in a letter addressed to the Hon. J. V. Chataway, Minister for Agriculture:—

As you desire to collect in a concise form any information on the subject, I shall be glad if the following should be of interest.

Coffee grown at a high elevation gives a very small crop, but one infinitely superior to that grown at a lower elevation, and contains a very large percentage of "Peaberry."†

While riding through the Rambodde Pass, between Gampola and Newera Ellya, Ceylon, my companion, Mr. G. Abercrombie Dick, a veteran planter, drew my attention to a clearing on the right which from its high and exposed position seemed just about the last place to find a plantation.

The place was named "Condigalla" (little windy stone), and belonged to the Messrs. Rothschilds. The crop was a most scant one, but on account of its superior quality the greatest care was observed in picking, pulping, and curing the crop. None of the crop was ever sold, but distributed in the shape of presents to all the crowned heads of Europe and others who had financial dealings with the Rothschilds.

The ultra prolific bearing of coffee in Queensland will not for some time to come affect the quality, but it will be necessary to restore to the soil, in the way of manure, what it most lacks to keep up the standard of quality.

Wash holing (one hole to every four trees) and burying tails—*i.e.*, the outer skin after being separated by the pulper—together with the small twigs, &c., after pruning and handling, will be found most beneficial.

In some districts of Queensland I should recommend the stripping of the maiden crop to give increased size and vigour to the trees to carry large crops.

With such a range of temperature as we possess in Queensland, the fermenting of parchment before washing out is a question to be demonstrated by experience, and presents no difficulty if certain lines are followed; but without the fermentation to remove the saccharine matter from the parchment, it is useless to expect a marketable sample.

As I have repeatedly reiterated, we have sufficient land which if cultivated would pay our national debt.

I shall be glad if these few notes should prove of interest.

YIELD OF COFFEE PER TREE.

OPINIONS vary much amongst amateur coffee planters as to what constitutes a good crop. They are told of trees which have borne 15 lb. weight of clean coffee, and of plantations where from 5 to 7 lb. was the usual crop, but such statements have to be largely discounted. Coffee-growing in Queensland is still in the experimental stage, and the most experienced planters from Ceylon, Brazil, Africa, and other producing countries are liable to be led astray, by applying their experience in our climate to a totally different one, especially as

*In preparing this paper, valuable assistance has been rendered the writer by those whose names are mentioned therein. In addition, he feels indebted to His Excellency Sir A. Blake, Governor of Jamaica; to the Hon. Q. O. Eckford, ex-United States Consul; to Geo. A. Douet, Esq., Secretary of the Jamaica Agricultural Society; to L. Frazer, of Montego Bay, and many others.

† "Peaberry" is the term used to denote a berry which contains only one cotyledon, or at most one developed and the other shrunk to a very small size.—Ed. Q.A.J.

regards rainfall and summer and winter temperature. Mr. J. Dansey, Manager of the Mackay Coffee Estates Company's property at Mackay, says that he has gone carefully through the figures prepared by Mr. E. Cowley, Manager of the State Nursery at Kamerunga, Cairns, and finds them substantially correct in the estimate of commercial coffee to the pound of cherry. The percentage, however, is apt to vary considerably, according to localities and the pruning the tree has undergone. In Mackay last season, a white boy, aged seventeen, picked on an average 120 lb. per day of ten hours; and had the trees been topped to a height of about 4 feet 9 inches or 5 feet, Mr. Dansey considers the lad would have very considerably increased this amount. He considers Mr. Hepburn's estimate of an average of 3 lb. of clean coffee per each tree far above the mark, for, although some isolated trees will give as much as from 5 to 7 lb. of clean coffee, the average all round an estate of, say, 50 acres would not be more than from 2 to 2½ lb., and this would be considered a heavy crop. He calls our attention to the unfairness of saddling the estate, out of its first crop, with all expenses connected with the opening of the estate and its three years' upkeep, &c., &c. In fairness to the product, it should be shown that once established the coffee-tree bears heavy crops year after year for many years; and that consequently, after the first crop, all is profit except for the yearly upkeep of the estate and the picking, curing, forwarding, &c.

GUARANTEE SUGAR-MILLS.

WE have received from Mr. E. Thatcher the following account of the Proserpine Central Sugar-Mill:—

The development of the sugar industry in the Proserpine district is being keenly watched not only by Queenslanders, but by a large number of Victorians, as the industry was first started in this district by a Melbourne syndicate under the style of the "Crystalbrook Sugar Company," who imported a splendid mill, which was sacrificed (on the stoppage of kanaka labour) to the North Eton Central Sugar Company, of Mackay, for a trifle compared with its original cost.

The advent of "*The Sugar Works Guarantee Act of 1893*" again revived the industry in the district; and by the indefatigable efforts of Messrs. Waite, of Breadalbane, The Glen Isla Proprietary Company, of Melbourne, G. Pott, P. Neilsen, R. E. Sexton, and others, sufficient areas were cultivated to induce the Government to erect one of the finest and largest central mills built under the Act.

The plant stands upon a site given by the Glen Isla Company, on the banks of the Proserpine River, and the clearing of the site was commenced in 1896; the erection of buildings and machinery following immediately.

Messrs Walkers, Limited, of Maryborough, made and erected the machinery.

Owing to the capacity of the plant and the small acreage under cane, it was deemed advisable to postpone the crushing till 1897, to allow of an increased area being planted, and, consequently, the mill did not start operations until the 20th of September of that year, and manufactured 1,350 tons of sugar from 10,900 tons of cane produced from 400 acres of land.

The tramway system of this mill consists of nine miles of permanent line and six and a-half miles of portable, 1 8-ton locomotive and 200 cane trucks, which will be taxed to their utmost this season, as the company have sufficient cane to make about 2,200 tons of sugar.

The district is splendidly adapted for the cultivation of cane, and the sugar-content ranges very high.

There are splendid farms on the Breadalbane and Glen Isla Freehold Estates still open for selection on very easy terms, and large tracts of Crown lands of excellent quality and in close proximity to the mill. The price paid for cane this season is 12s. per ton on the company's trucks.

There are two sets of 6-foot rollers with revolving knives in front, five multitubular boilers with automatic firemen, and the evaporating plant is quite up to date. The management of the mill is in the able hands of Mr. W. Lyle, who has had great experience in South America and other sugar countries, with Mr. C. Campbell as chemist and Mr. E. Thatcher as field manager.

Mr. W. J. Taylor is chairman of directors, and Messrs. G. A. Waite, C. Roberts, G. W. Pott, J. Chapman, and A. Fuller compose the board of directors, with Mr. A. P. Perkins as secretary.

Chemistry.

THE NEW CHEMICAL LABORATORY AT THE QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

By J. C. BRÜNNICH,
Agricultural Chemist.

As the new chemical laboratory at the Agricultural College, Gatton, has now been for some time in working order, it will undoubtedly interest some of our numerous readers to hear a little more about the building and its internal arrangement.

The laboratory has to fulfil a dual purpose of being a laboratory for the practical instruction in chemistry of the students of the College, and of being the analytical and research laboratory of the Department of Agriculture.

The Department of Agriculture has for a long time sorely felt the want of an analytical laboratory of its own, and some of the unavoidable analytical work had to be carried out in the past years by the Government Analyst, who, however, was already overburdened by work from various departments.

Now, however, that the laboratory, after unavoidable delays in erection of the building and internal fittings, waiting for the arrivals of chemicals and apparatus, testing and making up of the chemicals, setting up of the apparatus, &c., &c., is really completed, the department may be justly proud of their new establishment. The laboratory quite equals, with regard to building and fittings, the departmental laboratories in the southern capitals; with regard to colleges, however, it is far ahead of the similar institutions of our neighbouring colonies, where in most instances the establishment of laboratories at their agricultural colleges has so far remained a pious wish.

In the construction of the building, of course, economy was studied, and the building, which undoubtedly for various reasons should have been of stone or bricks, had to be erected, like the rest of the College buildings, of wood. Ventilation and light were chiefly studied, and for this reason the (in colonial buildings) customary verandas were left out, the windows being simply protected by small sky-shades. Still, even in its simplicity, the building is an ornament to the College grounds, and gives the impression of being built to a purpose.

The building is placed on low piles, giving just sufficient room to get at the main gas and water pipes and surface drains, which are all placed underneath the flooring.

The building, measuring 83 x 44 feet, contains seven rooms and a hall, and is throughout lined and ceiled.

The largest room, 43 x 34 feet, is the students' laboratory and lecture-room, and is fitted with eight long working benches, each having sufficient room for four students at practical work, and giving them the use of gas, water, sinks, and draught-hoods, cupboard and drawers, with which each place is fitted. The draught-hoods are connected by large pipes with the chimney, where an artificial draught is created, to take any fumes and vapours away. The draught-hoods being low, and connected with the pipes below the floor, do not obstruct the view of the lecturer's platform. For continuous working with acids and poisonous vapours, four draught-cupboards, each fitted with a double-glazed sliding front, and with gas, water, and waste pipes, are placed on both sides of this room.

The slightly raised lecturer's platform is fitted on its front with a lecturer's long bench, provided, of course, with the necessary gas and water taps, sinks, and waste pipes, whereas the back is provided with another bench, a double-sliding blackboard, and a roomy draught-cupboard.

A roomy working bench surrounds the whole room on which the apparatus in general use, as steam and air drying ovens, water-baths, foot blowpipe, burettes, &c., are placed.

The chemical balances for the use of the students are placed in a small lean-to attached to the larger room. Four of Oertling's long beam chemical balances are provided at present, but of course this number will have to be increased as soon as the laboratory has to work with a full number of students.

The students receive lectures on chemistry in their second and third year. The practical work is started in the second term of the second year. The lectures on elementary chemistry, two and a-half hours per week, are illustrated and made interesting by numerous experiments, and are as much as possible of a practical nature. In the first year after a general introduction into the general principles of physics and chemistry, the non-metallic and metallic elements are treated, dwelling principally on those of importance to agriculturists. The second year brings the students to the study of organic and agricultural chemistry. The practical course, one afternoon per week, teaches the student general chemical manipulations, lets him repeat some of the experiments seen in earlier lectures, and he learns some of the simplest but still important tests with regard to properties and value of manures, soils, water, milk, &c. A short course of qualitative and quantitative analysis is given in the last year, and a student showing a preference for chemical work may receive permission in this his last year to devote more time to laboratory work.

The room set apart for the departmental analytical and research work is placed on the other side of the building, and is, like the lecture-room, well ventilated and well lighted, measuring 43 x 18 feet. This room has a working bench with different shelves running right round, provided with lead-lined sinks in three of the corners. The fourth corner with slate top and iron hood, and all the woodwork protected by galvanised iron, is set apart for the working of muffle and combustion furnaces. The middle of the room is occupied by two large working tables, each with gas and water fittings, sinks on both ends, and drawers and cupboards underneath. The room further contains a roomy draught-cupboard, and the usual apparatus, as water and air ovens, sandbaths, Fletcher's muffle furnace, combustion furnace, condensers, &c., &c. At one end of the room a door leads into a small detached room, set apart for special

work, and contains besides bench and draught cupboard, a powerful foot blowpipe-table for glass blowing. At the opposite end of the room a door leads into the balance-room. The balances—three of Oersling's best analytical balances—are placed on specially firm stands with slate top. The woodwork of these stands goes without touching the floor straight into the ground, the stands being thus quite independent of the building and free from vibration. This room serves at the same time as study and reading-room, as several chemical publications and many of the most important standard works are kept there.

Between this room and the lecture-room, and connected with both, is the office of the chemist in charge.

On the other side of the hall is a store-room containing all the bulk chemicals and spare glassware, and also a well-fitted dark room for photographic and spectroscopic work. An excellent polariscope of the latest pattern is also kept in this room.

In two show cases in the hall a collection of all the soils from various parts of the colony as prepared and analysed will be kept.

A start with analytical work has been made, and the analyses of several samples of soil from the Government Experiment Orchard at Redland Bay are in hand now. Rather more time than usual is devoted to this work, as the samples are of special interest, being taken from land, both scrub and forest, for about fifteen years under cultivation, and from virgin land in the immediate neighbourhood. Samples of various parts of the colony will be collected and analysed in similar and absolutely uniform manner, and the results published from time to time. There is no doubt that by thus working uniformly the comparative value and merits of various soils will be distinctly shown, and any soil submitted for analysis afterwards can be judged by comparing it with soils of known properties. Of course other analytical work—such as feed stuffs, milk, butter, and other dairy products, water, and manures, &c.—will be carried out on similar lines. The latest and best apparatus for various classes of work has been imported direct from England. Still many pieces of special apparatus have to be added gradually as more money becomes available for this institution; for instance, a small experimental mill for the testing of wheat, a miniature vacuum pan, &c., will soon be needed. Later on it will also be necessary to start experimental work like the carrying out of manuring experiments in pots, which will need a special plant.

The gas with which the laboratory is supplied is derived from gasoline, made in a Martin's automatic gas machine. This machine was erected by Mr. Dangerfield, of Hanby and Dangerfield, Ipswich, and gives fullest satisfaction. The water for the building is obtained from a 10,000-gallon tank placed 18 feet over the ground, and giving thus a fair pressure. The water for the tank is pumped up from a well and from the Lockyer. Four large galvanised-iron tanks at the corners of the building provide the necessary rain water.

At present the *personnel* of the laboratory comprises only the chemist in charge and one assistant. The lectures and the superintendence of the practical work of the students absorb a large amount of the time of the chemist in charge, so that most of the analytical work will fall on the shoulders of the assistant. One of the advanced students has shown a special interest in chemistry, and spends most of his time in the laboratory, and begins already to be of some use. As the work increases, the staff will necessarily have to be enlarged. The building and rooms, however, are sufficiently large to allow the working of two or more assistants.

Vegetable Pathology.

STRAWBERRY LEAF BLIGHT.

SPHÆRELLA FRAGARIÆ, SACC.

By HENRY TRYON, Entomologist.

(PLATE LVII.)

Designations:—Leaf Blight, White Rust, Rust, Spot Disease, Sun-burn, Sun-scald, Flecken Krankheit, Taches Rouges, La Ruggine, Vaiolatura Rossa, Macchie Rosse, &c.

THIS affection of the strawberry, though little more than thirty-five years has elapsed since it was first described, is now already prevalent in Europe, North America, and Australia. This general distribution has, it would appear, been occasioned principally through trade in diseased plants. Indeed, numerous instances of such commercial dealings have come under the writer's notice during the past few months.

The time of its first appearance in Australia cannot now be ascertained; but Dr. N. A. Cobb, the well-known Pathologist of the New South Wales Department of Agriculture, made special reference to its occurrence in that colony in 1890 in his "Notes on Diseases in Plants," published in January, 1891* [(21), p. 61].†

The first public intimation of the existence of Strawberry Leaf Blight in Queensland was afforded by the present writer, in October, 1893, though its occurrence in the colony had some time previous to this come under his notice. At the time mentioned, a paper on the subject was read by him before the Natural History Society of Queensland, and afterwards reproduced, under the heading "Strawberry Disease," in the *Queenslander* of 21st October of that year. At the present time, it is, it would appear, generally prevalent throughout the southern portions of the colony, though it is not always that it occurs with such virulence as to form a subject of complaint on the part of strawberry-growers. Not infrequently, however, it serves as the unsuspected cause of a poor and uneven crop, or its presence may result in a greatly diminished yield from the second and third seasons' fruiting.

SYMPTOMS.

The following quotation from the paper printed in the *Queenslander*, and above alluded to, will serve to indicate the characteristic appearances presented by badly diseased strawberry plants—"On the upper surface of the still green leaves, you will notice small, conspicuous deep-purple or red spots [*vid.* Plate LVII., figs. 1 (upper surface) and 2 (lower surface)]; others of larger size with brown centres, and others again with the centres grey or white, and in both cases surrounded by a dark-purple border, shading off towards the healthy tissues to reddish-brown. These conditions represent successive stages in the progress of the disease. The spots again may vary in size from one-sixth

* Should it prove that the *Phyllosticta fragaricola*, Desm., represent not an autonomous fungus, but a special stage or condition in the life-history of *Sphærella fragaria*, Sacc., as suggested by Frank [(27), p. 393] and others, its first recorded occurrence in Australia will date back to 1884, for in that year the late Frazer S. Crawford sent examples of this *Phyllosticta* to Dr. W. Trelease, Professor of Botany at the University of Wisconsin, remarking as follows: "It is common—almost universal—in South Australia, but does not appear to do very much harm there" [(3), p. 547]. The same fungus was recorded in December, 1893, by F. M. Bailey, Colonial Botanist, as occurring in Queensland in that year [(26), p. 113]. This identification (as F. M. Bailey informs the writer) was made on the authority of Dr. M. C. Cooke.

† In this and similar references appearing elsewhere the initial number relates to that appended to titles of works consulted, given in the concluding section of this memoir.

to nearly one-fourth of an inch across; and in several instances have coalesced or united, so that still larger areas of discoloured tissue are produced. Leaves more badly affected still are turning brown from the tip and edges inwards, but the majority are already dead and shrivelled up. The calycine leaves of such stunted fruit as is still green are similarly diseased, but there is, however, little fruit that has not already wilted and become brown, and is now hanging from withered and shrunken foot-stalks. Most of the roots, too, are already dead, though a few fresh ones seem to have been recently put forth."

It usually happens, however, that the symptoms manifested by strawberry plants affected by Leaf Blight are less pronounced, and that the disease is less quickly fatal, but its existence will always be indicated in the presence upon the foliage of purple, or purple-grey centred, spots in however small number these may be manifested.

EFFECT OF DISEASE.

Unless exceptional circumstances exist or supervene to naturally check the progress of the disease, it will always seriously injure the plant in connection with which it occurs. This injury may not be at once manifested, but the affected plants will gradually become weakened, and, if they produce fruit at all this will be very uneven in size and irregularly ripened. They will also become stunted, owing to their inability to assimilate food material in consequence of their foliage being infected.

A New South Wales correspondent of the Department of Agriculture of that colony writes as follows on this subject:—"I forward herewith a specimen of strawberry plant, showing the way the plants wither in their efforts to ripen their fruit. When planted they grow vigorously, and throw out a promising lot of bloom; but, after re-opening one or, possibly, two fruits, the remainder of the plant withers as though scorched by fire. After a short rest the plants again throw out fresh leaves, and bloom as before, with the same disappointing results. This process is repeated throughout the season." This testimony is quoted by Dr. N. A. Cobb [(21), p. 61].

A. H. Benson, formerly an officer of the Department of Agriculture of the above-mentioned colony, has also informed the writer as the outcome of his own personal observations, that whereas formerly the Chatswood, Ryde, and Parramatta divisions, of the county of Cumberland, constituted a large and important strawberry-growing area in that country, the cultivations devoted to this plant in these districts have now, for the most part, been abandoned in consequence of the occurrence of Leaf Blight. F. L. Jensen [(29), p. 480], in an article on the strawberry, moreover, alludes to the occurrence of Leaf Blight in New South Wales, characterising it as "a really serious strawberry disease."

CONDITIONS FAVOURING DISEASE.

1. *Environment*.—It has been held, by some of the best authorities on plant pathology, that heavy clay soils, as distinguished from lighter sandy ones, are especially conducive to the presence of the disease. Amongst these may be mentioned Sorauer, and Briosi, and Cavara [(8), No. 14]. In fact, the first-mentioned savant goes so far as to state his opinion that the general spreading of the disease can best be counteracted by setting the plants in fertile, loose, sandy soils, in open sun-exposed situations [(5), p. 368]. This prejudicial influence, exerted by soils of the character mentioned, has not been universally remarked. Observations in Queensland, however, point to the conclusion that strawberry plants grown in shallow soils, reposing on ill-drained stiff subsoils, are especially subject to the presence of Leaf Blight. Sudden changes in the prevalent character of the weather are also conducive to the increased virulence of the disease; such as a dry "spell" following, with little interval, a wet season, as also the opposite conditions. An unusually heavy crop may also be followed by a bad attack; and, generally, any condition that tends to weaken the plant, or to militate against its successful growth, favours the development of Leaf Blight.

2. *Plant Susceptibility*.—Again it may be remarked that certain varieties of strawberries are especially liable to be attacked by Leaf Blight; whilst, on the other hand, others enjoy a comparative immunity from its onslaught. Observations in Queensland have not as yet been conducted by the writer for a sufficient length of time to enable him to state which varieties are to be included in one or other of these two categories; though a locally raised seedling—Pink's Prolific—seems to be generally regarded as being little subject to the presence of the disease. There are, however, grounds for concluding that a particular strawberry's susceptibility—or non-susceptibility—to Leaf Blight will be found to vary in different seasons and especially under different soil conditions. This feature connected with the disease has been especially commented upon by W. Trelease. He writes, too, as follows:—"From my observation, and from the testimony of correspondents of the station (Wisconsin Agricultural Experiment Station), I should give the following list as spotting most in this section:—Downing, Wilson, Russell's Prolific, Big Bob, Bidwell, Captain Jack, Forest Rose, and Manchester. The Crescent is one of the varieties least affected, though by no means entirely exempt. . . . The Windsor Chief and Sharples are also noticeably free from 'rust.'" [(3), pp. 48-9]. T. L. Brunk, writing after many years' experience some six years later, gives a table showing the susceptibility of a large number of varieties of strawberries to the Leaf Blight, and concludes that the varieties Bidwell, Van Dieman, Anna Forest, Haverland, Daisy, Ruby, and Bubach No. 5 are the five least susceptible varieties, when growing upon the Maryland Agricultural Experiment Grounds [*c.f.* (15), pp. 104-8].

Again although Briosi and Cavara (8) mention the Chilian Strawberry (*Fragaria chinensis*) as being one of the species on which the Leaf Blight occurs, more than one American authority has pronounced it immune. The Fruit Expert, A. H. Benson, has also pointed out to the writer, as being blight-proof, a white-fruited strawberry (with a blush on the sun-exposed side), occasionally locally regarded as one of the Hautbois (*F. elatior*) group. This, he states, is grown in the Zillmere and Bald Hills districts, and adds that it is the result of a cross between *F. chilensis* and another species of *Fragaria*. *Fragaria chinensis* has been described as being "a large and hardy species, with thick leaflets, soft silky on the underside." Downing ["Fruit and Fruit-trees of America, 1892"] assigns the following varieties to it:—Patagonia, Greenwell's New Giant, Greenwell's French. From it are stated also to have been derived the numerous Pine (*Ananas*) varieties of strawberries, by crossing with other species of *Fragaria*.

NATURE AND CAUSE.

On examining the leaf-spots, whose presence, as it has been already stated, are characteristic of the occurrence of the disease, it will be found that the pale-brown, or whitish-coloured, centres that exist in connection with them are composed of dead tissue that is already both dry and brittle. If one of these spots be cut through, and a thin slice or section of the tissue of the leaf thus exposed (suitably prepared) be examined by the aid of a microscope, the appearances illustrated on Plate LVII., fig. 3, will be remarked. In this *a* represents the cellular leaf-substance that is as yet structurally unaffected, but here the cells have their contents already of a purple colour, corresponding as they do in position to the purple border bounding each leaf-spot externally whose presence they account for. Further, *b* marks the position of the central pale area of the spots. Here, as will be observed, the leaf-tissue is shrunken, being dry or sapless. Further, at *c* occur in tufts little erect threads having oblong bodies at their extremities. These tufts are constituted by the external growth of a special fungus named *Ramularia Tulasnei*, Sacc.; and the oblong bodies are its spores or conidia. (These highly magnified are represented by Fig. 6*a*.) Again, at *d* will be remarked little thread-like bodies, that pass from the base of the tufts into the tissue (*a*) occupying the intervals between adjacent leaf-cells.

These are the spawn threads, or mycelia, of the fungus, and are the organs through which it obtains its nourishment from the plant in which it is a parasite. It is these also that in the course of their growth and vital activity change the colour of the cell-contents from green to purple-red.

The special fungus mentioned may be discerned by the aid of a powerful lens as it occurs on the surface of the pale central areas of the spots—its presence being shown by the occurrence of almost white scale-like matter that is met with towards their external borders. This it is that causes the Leaf Blight—the spores being the immediate agency for infection. These spores, that occur at the extremities of the longer of the erect threads—or hyphæ—constituting the tufts, are linear, straight, somewhat pointed at each end, and are either without cross divisions—or septæ—or are formed of from two to four cells. Different individuals vary in length, being from 26 to 42 micromillimetres in length and scarcely 35 micromillimetres in breadth (a micromillimetre being the equivalent of about one-twenty-five-thousandth part of an inch). The thread-like filaments, or mycelia, that are slender hollow tubes—and which, “pushing their way between the cells of the interior of the leaf, by contact, both disorganise the contents of such cells and absorb their fluid portion”—are narrower than these conidia or spores, measuring only from 1 to 3 micromillimetres in thickness.

The spores, or conidia, that may at first occur in twos or threes, end on at the extremity of the threads constituting the tufts, are very readily detached from their supports. Moreover, in the presence of moisture, or in drops of water, they quickly sprout, throwing out slender tubes (sprouting conidia are shown on Plate LVII., fig. 6 *b*). Miss J. W. Snow, a distinguished Fellow of the Cornell University, in the course of a series of investigations concerning the life history of the fungus of Strawberry Blight, made in conjunction with W. R. Dudley (*Vid.* (9) *passim*), has shown that this sprouting takes place with especial readiness in a decoction of strawberry leaves, germination commencing in about six hours from the time of sowing; also, that when such artificial culture is conducted during spring a second generation of conidia are developed from the mycelia or spawn-threads. Similar results were subsequently obtained by Dr. P. Voglino, who out of ten cultures noted in four the formation of three generations of conidia, with an interval of from ten to fourteen days between successive ones [(24), p. 13].

W. R. Dudley and Miss Snow further succeeded in artificially producing the disease by sowing these conidia or spores, that they had found to sprout with such readiness. To quote their report:—“Numerous infections were made [by them] in April and May, by placing both germinated and ungerminated conidia on the upper and the under surfaces of young strawberry leaves, which we [herself and W. R. Dudley] believed to be previously uncontaminated by the fungus. It was found that the germ tubes bored their way between the epidermal cells of the upper surface, but they were not observed to enter by the stomates of the under surface, although infections took place readily from that surface. Entrance by the stomates was certainly not the usual mode of attack. In about ten days spots, brownish instead of red, appeared on the leaf, and in fourteen days all the places infected usually showed well-defined spots from which conidia were growing. In some cases one leaflet only, in other cases two, were infected, and the disease always appeared only on the leaflets and in the places infected; excepting in a few cases where, from our control plants or by other tests, we ascertained our plants to be already contaminated.” Five years subsequent to this Dr. P. Voglino obtained somewhat similar results, as he also informs his readers [(24), p. 43]; infections being accomplished in from fifteen to twenty hours in this instance.

Hitherto attention has been confined to the special fungus that is associated with Strawberry Leaf Blight, in temperate climates at least, exclusively during the summer months. But in their case there is an alternate form of the fungus-parasite that maintains the continuous growth of the latter throughout

the winter months.* This occurs in or upon the central areas of the spots, and is only met with when the leaves are dead—or apparently so—and withered up. Outwardly the fungus now presents the appearance of minute black points, visible to the naked eye. These black specks arise from the presence of dark, spherical, cellular-walled, hollow little bodies or conceptacles, technically known as “perithecia.” These are attached to beds of spawn threads, or mycelia, that traverse the leaf-tissue, and are each filled with obovate-shaped sacks, measuring from 30 to 40 micromillimetres in length, each of which contains eight spores; the latter being pale-brown in colour, elongate-ovate, rounded at each end, and divided unevenly into two parts. They measure 15 micromillimetres in length and 3 micromillimetres in breadth.† (A perithecium with its contained asci is figured on Plate LVII., fig. 4—a representing the asci or spore-sacks. Figure 6 shows an individual ascus with its contained asco-spores. This form of the fungus is named *Sphærella fragariæ*, and being the final or mature form of the parasite leads to the adoption of its name for the latter.)

W. R. Dudley and Miss Snow have again experimentally proved that though these asco-spores or winter spores sprout, even when within the spore-sacks and the conceptacles or perithecia that contain them, they do so far less readily than do the above-mentioned conidia or summer spores. They have also shown that the sprouting winter spores will not immediately infect the strawberry leaf, but there must first arise conidia or summer spores upon the mycelia that are formed in the course of their development [(9), p. 179-80]. Dr. P. Voglino, moreover, subsequently confirmed the discovery [(4), p. 15]. This occurrence of the parasite in its final form upon the dead and withered leaves will point to the reasonableness of the injunction to destroy these as one of the means for coping with the disease included under “Preventive Treatment.”‡

FORMS OF THE FUNGUS PARASITE.

There are some grounds for concluding that the special fungus associated with the diseased condition of the leaves is one that assumes a variety of appearances, according to the condition of its host-plant and the season of the year at which it is observed. Allusion has already been made to the occurrence of two of such forms—

The Tulasne brothers (1) referred to it no less than four different forms of parasite, distinguished by as many generic names. These are:—(a), a summer conidia-bearing form, that they regarded as a species of *Cylindrosporium* [*C. Grevilleanum*, Tulas., now *Ramularia Tulasnei*, Sacc. (2)]; (b), an autumn conidia-bearing form—*Graphium phillogenum*, Desmazieres; (c), a pycnidia-bearing form with stylospores—*Ascochyta fragaricola*, Lsch. (regarded by some authors as probably identical with *Phyllosticta fragaricola*, Desm.); and (d), a perithecia-bearing form, with asci—*Stigmatea fragariæ*, Tulasne (*Sphærella fragariæ*, Saccardo [(2a)]). Finally, to these have been added by other writers another form—viz., (e) *Septoria fragariæ*, Desm. §

Although, however, the ability to recognise these different fungus forms is a matter of some importance, should it be definitely ascertained that they represent different aspects of a single parasite, the consideration of the characteristic features by which they are distinguished must be for the present

*In Southern Queensland as it would appear—the form already described and known as *Ramularia Tulasnei*, Sacc., is met with on affected strawberry plants throughout every month of the year—a phenomenon which would suggest the probable existence of a greater proneness to ready dissemination than would otherwise be experienced.

†A micromillimetre or μ —as above stated—is equivalent to about $\frac{1}{25000}$ English inch.

‡ It has, moreover, been observed that in the United States the fungus has another winter form that is characterised by the manifestation of minute masses of intricately interwoven mycelial threads, that appear as blackish specks, and that have forced their way through the epidermis or leaf skin at the site of the spots of disease. These masses, that are technically styled *sclerotia*, develop (when kept under suitable conditions of warmth and dampness) upon their external surfaces upright threads (basidia) that are terminated by summer spores (conidia). Cf. Trelease [(3), p. 52], and W. R. Dudley [(9), pp. 175-6, figs. 3 and 6].

§ Definitions of these are given amongst others by Saccardo [2]—(a), being described under Hyphomycetæ [p. 203]; (b), ditto [p. 624] (*s.v. Graphiothecium*); (c), under Melanconie [p. 399]; (d), under Pirenomycetæ [p. 505]; (e), under Sphæropsidæ [p. 511]; and, finally, *Phyllosticta fragariæ* is described by the same authority under Sphæropsidæ [p. 40], and by M. C. Cooke [(23), p. 346].

postponed; the reader being meanwhile referred to Saccardo's work, cited in the foot-note on p. 311. It may be remarked, however, that, with the exception of (d) and (e), that both occur on rotten or dried-up foliage, they are all associated with the leaf-spots already described; also that (c), (d), and (e) appear as minute black points upon already dead leaf-tissue.

But it may be further added, also, that the reference of so many differently named fungi to one parasite, originally made by L. and C. R. Tulasne, and since adopted by the majority of subsequent writers, on the subject of Strawberry Leaf Blight, has not—as has been remarked by Dr. P. Sorauer [(5), p. 367]—been made to rest on experimental evidence, but on “gemeinsame vorkommen,” and, indeed, as Dr. A. B. Frank affirms—in the last edition of his “Pilz-parasitären” [(27), p. 312]—more exact inquiry is required to establish the connection between the different forms. Lawson Scribner has, however, “asserted his belief, based on direct observation, in the correctness of Tulasne's view” [(6), p. 333].

Meanwhile, however, W. R. Dudley (formerly Assistant Professor of Cryptogamic Botany at the Cornell University) has given us partially confirmatory evidence, tending to show the connection between the summer conidia-bearing form (*Ramularia Tulasnei*, Sacc.) and the winter resting-spore condition (*Sphærella fragariæ*, Sacc.) Perithecia (the fruiting organs of *Sphærella*) “were found with mature asci in April; and on placing an ascus in a hanging-drop the spores were observed to germinate in about six hours within the ascus. The germ-tube developed from one end of the spore, passing, in case of four of the spores, to the end of the ascus, perforating it; whilst the germ-tubes from the remaining four perforated the opposite end. The mycelium formed by these germ-tubes was larger than that from the conidia (of *Ramularia*), grew more vigorously, soon producing—at the surface of the culture-drop—conidia like those already described and figured as the summer conidia” [(9), pp. 178-9].

Dr. P. Voglino, as the outcome of experiment, has obtained even further results of a confirmatory nature. These, as recorded in the Italian journal, *Il Coltivatore*, for 1894, are as follows:—By sowing the reproductive bodies of the *Ramularia* in water he obtained three successive generations of conidia; and on sowing conidia of the first generation upon strawberry leaves, he not only obtained a further crop of these summer spores, but also a fungus organism having the characteristics of *Ascochyta fragariæ*—in possessing conceptacles or pycnidia containing spores, 12-17 microm. in length, which were found in turn to germinate at a temperature of from 10 degrees to 12 degrees C. He also obtained, in a similar manner, minute rounded corpuscles just beneath the upper surface of the leaf that contained spermatia, that, on being sown in water with which had been mixed an infusion of strawberry leaves, sprouted after two days, and on being in turn placed upon a leaf of this plant—already dry, but free from disease—gave rise (after twenty days) to an organism having all the characters of *Sphærella fragariæ*, being possessed with a perithecium containing asco-spores [cf. (24), “La ruggine delle fragole,” separate, pp. 13-14].

TREATMENT.

The Strawberry Leaf Blight having its location within the tissue of the foliage, it is obvious that “spots” that have once appeared upon the leaves cannot be removed by any direct curative process; nor can the parasite itself that is associated with and has occasioned them be destroyed without their being killed also. Efforts in coping with it, therefore, must perforce be in the direction, of preventive treatment. The measures coming within this definition, that are recommended for adoption, are as follows:—

1. Those who contemplate establishing a plot of strawberries with plants procured from outside sources should especially require, from those furnishing them, that they be entirely free from Leaf Blight or Spot.

2. Should, however, the plants, on arrival, manifest affected foliage, this should be removed prior to their being taken to the field, all dead leaves being, at the same time, trimmed off, and the refuse thus obtained should, moreover, be promptly burned; and the plants thus prepared should, moreover, be dipped in one of the fungicidal washes subsequently described.

3. Strawberry-growers should also endeavour to provide, by selection and weeding out of diseased plants (or even by removing affected leaves when the disease is but little in evidence), a clean stock for the purpose of starting from time to time new beds.

4. In selecting varieties of strawberries for cultivation, choice should be exercised, other things being equal, of those that are either generally or locally less liable to be attacked by the Leaf Blight than are others.

5. In replanting, a fresh site should, if practicable, be selected, as the soil upon which diseased plants have grown is contaminated by the presence of fungus spores, derived from their dead and semi-rotten foliage, for a considerable time after their removal.

6. This new site, as well as the location of any additional area devoted to strawberry culture, should not lie in the direction of a prevalent wind that passes over a diseased plot.

7. Should it not be practicable to select a fresh site, the old plants on removal should be burnt on the spot with as little disturbance to them as possible, and the soil itself well limed.

8. Before planting, the soil should be well worked till quite free, and, if necessary, subsoil drained.

9. Land also having a "wet bottom" should not be devoted to strawberry cultivation.

10. In the case of a plot of strawberries in which the disease is generally prevalent, it will be usually found advisable to root out and replant should the new foliage following a heavy crop of fruit* prove to have already become badly attacked; or if two crops of fruit have been already secured.

When a strawberry bed is more or less affected by Leaf Blight, and circumstances generally indicate neither the necessity nor expediency of rooting up the plants for the purpose of staying the progress of the disease, there is still room for preventive treatment to be adopted. The numbers in which the summer spores (or conidia) exist in connection with the parasitic fungus occasioning the disease; the facility with which they become detached from their supports; the ease with which they may become transported by ordinary atmospheric agencies, and the readiness with which they may sprout and so originate fresh Leaf Blight, are features connected with them that point to the necessity for the adoption of means for protecting the still healthful foliage from their visitation, and from their parasitic growth thereon with attendant disease, as well as the leaves that are to unfold in the course of subsequent plant-development; and also to secure freedom from attack to beds of plants from which the disease is as yet absent. Amongst measures available for this purpose, the following have been recommended:—

1. When little Leaf Blight is noticeable, the spot-bearing leaves should be cut out, the plants being systematically gone through for this purpose. But all spot-bearing or diseased foliage should, as it is detached, be placed in a bucket, and, being taken therein off the field, at once burnt; for, if leaves in this condition are permitted to dry on the ground, they will all the more readily scatter their spores and so extend infection.

2. When the crop has been harvested, the whole of the foliage—both that which is blighted, and that which is sound—should be cut off and without removal destroyed. This procedure was recommended by W. Trelease in 1884. The most convenient way for effecting the destruction of old and spotted leaves, he wrote, "is by mowing badly rusted beds soon after the fruit is gathered, covering the dry tops with a light coating of straw, or harrowing up the old mulchings and burning them. . . . Everyone who has tried burning over a strawberry bed has been surprised by the vigorous and healthy appearance of the new foliage which soon unfolds" [(3), p. 85].

3. Otherwise, to accomplish a like result, and as recommended by A. W. Pearson in 1889, the plants should be sprayed with a mixture of sulphuric acid and water, containing one pint of the former in every six gallons of the latter. "When through picking [writes this observer] I sprayed some rows

* Trelease (W.) quotes a strawberry-grower of very large experience who is emphatic in declaring that strawberry plants that have been weakened by heavy crops, or from other causes, are especially prone to be seriously attacked by Leaf Blight; several instances being given in confirmation of this conclusion [(3), 55-58].

of strawberry plants with a solution of sulphuric acid—one pint to six gallons of water. This mixture killed all as if burnt with fire. Soon a new growth started from the crowns, and now the contrast in the apparent health of the rows (as compared with the unsprayed ones) is quite perceptible. The sprayed rows are nearly healthy; those not sprayed are much diseased" [(14), p. 49].*

4. The plants should be sprayed with some fungicidal wash. This should be applied (by aid of a knapsack, or bucket spray pump) indiscriminately to blighted and to sound foliage alike: that it may prevent spores that may have become attached to the latter from sprouting and so starting the occurrence of disease in connection with them, as well as kill those spores that are still associated with the spots upon the already affected leaves. In this connection the following fungicidal washes have each been employed with highly satisfactory results:—

Potassium Sulphide (or Liver of Sulphur).—A solution of this chemical has been recommended for use of two different strengths; J. C. Arthur advocating a wash containing $\frac{1}{2}$ -oz. to 1 gallon of water [$\frac{4}{5}$ Imperial gallon], and Lawson Scribner the same amount of potassium sulphide to 4 gallons ($3\frac{1}{3}$ Imperial gallons). Regarding results following its employment, the former of these plant pathologists writes that "the object sought (*i.e.*, the holding in check the spotting of the leaves) was attained, as that part of the bed took on a more vigorous growth, and showed fewer spotted leaves than the remainder. In fact, the difference between the sprayed and unsprayed portions was so marked that it seemed unsafe to ascribe it wholly to the fungicide" [(7), p. 351]. Sulphide of potassium wash, of the strength indicated by J. C. Arthur, is also amongst those fungicides suggested for employment in this connection by Dr. N. A. Cobb [(21), p. 60].

Ammoniacal Carbonate of Copper.—This may be made as follows:—(a), in a vessel containing 4 gallons of hot water dissolve about 5 lb. of carbonate of soda (salsoda), and to this add 1 pint of strong ammonia and 3 oz. of carbonate of copper† [(20), p. 386]; or (b), "into a vessel having a capacity of 2 quarts or more pour 1 quart of ammonia ((22 degrees Baumé), add 3 oz. of carbonate of copper, stir rapidly for a moment, and the carbonate of copper will dissolve in the ammonia" [Progrès Agricole et Viticole, Aug. 1887, p. 114]. In either case there results a clear blue liquid that may be kept indefinitely. When required for use, the solution should be diluted with water to 50 gallons, some molasses being at the same time added to promote adhesiveness.

Bordeaux Mixture.—Careful experiments on the part of H. Garman, of the Kentucky Agricultural Experiment Station, made in 1890 [*vid.* (18), pp. 3-18] "have indicated quite plainly the efficacy of this mixture. Treatment with the 22-gallon formula of Bordeaux mixture [*i.e.*, 6 lb. of copper sulphate and 4 lb. of lime in $17\frac{1}{2}$ gallons of water] begun immediately after the removal of the berries, and continued at intervals of two weeks, until danger from the parasite was passed, proved more effective than Eau Celeste, liver of sulphur, &c., and were in most respects entirely satisfactory" [Fairchild (28), p. 45]. Again, investigations conducted by T. L. Brunk at the Maryland Agricultural Experiment Station have shown similar good results following the employment of this fungicide: "It is not [writes this authority] so easily washed off as other mixtures, and hence acts as a preventive of the disease for a long time. Three sprayings with it in the summer and fall [in Queensland this would correspond to our spring from September onward—H.T.]; the first as soon as fruiting has ceased, and the other two at intervals of three weeks, and one spraying

* It is, however, incumbent upon the writer to point out that this destruction of the foliage, either by fire or acid, is, unless undertaken at the time indicated, liable to injure the plants by depriving them of the means for elaborating material required for their subsequent growth. But, immediately after fruiting, the plant temporarily rests, prior to the unfolding of new foliage, and it is therefore during this interval that the entire leaves may be removed with little danger to it.

† Dr. N. A. Cobb quotes Professor Chest r's method for manufacturing carbonate of copper, for 3d. per lb., plus the labour of making.—*Agricultural Gazette*, Sydney, New South Wales, III., p. 300: 1892.

before the flowers appear, will afford nearly a complete protection against the disease." He also writes of very beneficial results accruing from spraying with Bordeaux mixture (medium strength) after fruiting, and following this after an interval of six days with a second spraying with ammoniacal carbonate of copper solution [*vid.* 20, p. 389].

The employment of this reagent in coping with Strawberry Leaf Blight has been also especially recommended by Dr. N. A. Cobb, of the New South Wales Department of Agriculture (*vid.* (21), p. 492).*

These three fungicides—and others might be alluded to—are mentioned to suit the convenience of growers. Testimony, however, supports the conclusion that the use of Bordeaux mixture is likely to be attended with the best results. If, however, Red Spider be present on the foliage of the strawberry plants together with Leaf Blight, the first-mentioned fungicide (potassium sulphide) should preferably be employed. In all cases it is desirable that a proper spraying-pump be available for making the applications. Spraying operations must be, of course, desisted in from the time that the blossoms are formed till that of the completion of the harvesting of the crop.

In conclusion, it is perhaps necessary to point out that, because instances of the successful employment of several of the different methods of treatment mentioned have been derived from the experience of residents in other countries, it is not to be inferred that there are grounds for concluding that they will not be equally efficacious in Australia also. For the contrary is the case; and indeed A. H. Benson, Fruit Expert to the Department, has assured the writer that he has met with instances in New South Wales of Strawberry Leaf Blight being successfully coped with by the systematic employment of either Bordeaux mixture and carbonate of copper solution, as suggested by Dr. Cobb for use in that colony for the purpose of accomplishing this end. There is no reason, therefore, why—if the recommendations now tendered be given effect to—what is proving to be a most troublesome strawberry disease should not be held completely in check.

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* The following directions for making Bordeaux mixture are given by B. T. Galloway, Chief of Division of Vegetable Physiology and Pathology, United States Department of Agriculture:—In a barrel or other suitable vessel place 25 gallons [the gallon of the United States—H.T.] of water. Weigh out 6 lb. of copper sulphate, then tie the same in a piece of coarse gunny sack, and suspend it just beneath the surface of the water. By tying the bag to a stick laid across the top of the barrel, no further attention will be required. In another vessel slack 4 lb. of lime, using care in order to obtain a smooth paste, free from grit and small lumps. To accomplish this, it is best to place the lime in an ordinary water-pail, and add only a small quantity of water at first, say a quart or a quart and a-half. When the lime begins to crack and crumble and the water to disappear, add another quart or more, exercising care that the lime at no time gets too dry. Towards the last considerable water will be required, but if added carefully and slowly a perfect smooth paste will be obtained, provided, of course, the lime is of good quality. When the lime is slacked, add sufficient water to the paste to bring the whole up to 25 gallons. When the copper sulphate is entirely dissolved and the lime is cool, pour the lime-milk and copper-sulphate solution slowly together into a barrel holding 50 gallons. The milk of lime should be thoroughly stirred before pouring. The method described ensures good mixing, but to complete this work the barrel of liquid should receive a final stirring, for at least three minutes, with a broad wooden paddle. It is now necessary to determine whether the mixture is perfect—that is, if it will be safe to apply it to tender foliage. To accomplish this, two simple tests may be used. First, insert the blade of a penknife in the mixture, allowing it to remain there for at least one minute. If metallic copper forms on the blade, or, in other words, if the polished surface of the steel assumes the colour of copper-plate, the mixture is unsafe, and more lime must be added, &c. ("Spraying for Fruit Diseases," pp. 6-7, 1896.)

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NOTE.—The above is not to be regarded as constituting a bibliography of Strawberry Blight.

DESCRIPTION OF PLATE.

1. Leaf (upper surface), showing disease, mild attack (nat. size). [From photograph by F. C. Wills.]
2. Leaf (under surface), the same.
3. Section of leaf at edge of spot, showing parasitic fungus—*Ramularia Tulasnei*, Sacc.—magnified—*a*, unaffected portion; *b*, affected portion; *c*, fungus, external growth (hyphæ and conidia); *d*, fungus, internal growth (mycelia). [After W. R. Dudley (9), fig. 2.]
4. The Parasitic Fungus: Winter Form, or *Sphærella fragariæ*, Sacc., magnified, showing conceptacle or perithecium, with—*a*, ascus, or spore-sack. [After Voglino (24).]
5. Ascus, or spore-sack with spores (asco-spores), from perithecium, more highly magnified. [After Voglino (24).]
6. Conidia, or summer spores, from *Ramularia Tulasnei*, Sacc.—*a*, unsprouted; *b*, sprouted. Highly magnified. [After Voglino (24).]



STRAWBERRY LEAF DISEASE (*Sphaerella fragariae*, Sacc.).

Animal Pathology.

TUBERCULOSIS IN SPAYED COWS.

By W. C. QUINNELL, M.R.C.V.S. Lond.,
Government Veterinary Inspector.

NOTWITHSTANDING that a great deal has been written on Bovine tuberculosis and its propagation by heredity and contagion, I am not aware of any authentic records stating the disease to have been unwittingly introduced amongst cows by the operation commonly known as spaying. I may therefore be permitted to give here a general survey of the same, seeing that the subject is of itself of the highest importance, and that, moreover, since the recent short communication relating to the above, reported to the Stock Department and subsequently published, there has been a general desire for further information on the subject. This article may therefore be looked upon as a continuation of my previous remarks.

During the month of July 332 spayed cows were operated on at one of the Brisbane Meat Works. A casual inspection of the animals in the pens showed that they were apparently in good health, and, to use a common term, "in fair butchering condition."

When slaughtered, however, sixty head, or 18 per cent., of this particular mob were condemned and destroyed for tuberculosis, the peculiar characteristic nature of which at the autopsies irrefutably demonstrated that the disease was caused by the operation of spaying, and that such data was the most extensive I have encountered during my connection with the various meat freezing and preserving establishments.

POST-MORTEM REVELATIONS.

1. From anatomo-pathological appearances revealed at the autopsies of the cows in question, there were a very few that exhibited the generalised form of the malady, whilst the majority were affected with the variety known as tuberculosis of the serous membrane (peritoneum)—namely, that membrane which lines the abdominal cavity and covers its viscera.

2. The macroscopical lesions presented on *post-mortem* examination morbid growths, which had all the manifestations pertaining to tuberculosis, varying in size and formation, and these lesions were at times exclusively localised, whilst again extending over various areas of the peritoneum, and, when the abdominal viscera were attacked, showed distinctly that it was a case of secondary infection.

3. In view of the fact that tubercular lesions permit one to approximately guess their age when examined by the naked eye, from observations in this direction it was noted that one element remained constant—namely, that the *older* tubercular deposits were found encircling the inflammatory remnants—the *primary potent infective focus*—the result of the spayer's knife and interference; whilst the lesions from that centre onward were seen to be passing through all the phases of their metamorphosis, and that the terminal growths were bounded at their periphery by an inflammatory zone—tubercular peritonitis—indicating the malady's encroachment upon the healthy serous membrane.

CONCLUSIONS.

When we consider, firstly, the abdomen to be a closed cavity, and which we understand a receptacle impervious, under normal circumstances, to the atmospheric air; *secondly*, the accepted notion that a contagious disease cannot arise *de novo*, but as a result of the introduction from without of a special virus or germs of a particular disease; and, *thirdly*, that the train of evidence brought to light at the autopsies almost always showed distinctly the picture of an undoubted inoculation-tuberculosis, as the tuberculous processes in the abdominal cavity were found in the neighbourhood of the seat of inoculation, or, when absent there, were recognisable at other places of the peritoneum, I can only come to the conclusion that tuberculosis, in the majority of these animals, was introduced *traumatically*—namely, by the operation of spaying—and that the contagious material was furnished and transported from the minority of the same mob, which were affected with tuberculosis prior to the operation of spaying, and which subsequently exhibited on *post-mortem* the malady in the generalised form.

To further support this conclusion, I may state that, from records of experiments which have been made to demonstrate the transmissibility of tuberculosis, the lesions consequent of inoculation (intra-peritoneal) are similar in characteristics to those exhibited in these cows.

NECESSARY MEASURES FOR PROTECTION.

If it were possible to estimate the diminution of wealth which occurs by reason of preventable losses among stock, even in the course of one year, many no doubt would be considerably astonished.

I speak designedly of avoidable losses, for many cattle could be saved by the application of scientific principles and resources, especially when the methods which science would dictate in such cases are not difficult to understand nor to exercise.

It has been shown also that the disease is a contagious one, hence the necessity in the selection of subjects and *strict antisepsis*.

Whenever practicable, it would be a wise precaution to draft out those suspected of ill-health from amongst the mob to be spayed. Operate on the sound beasts first, and then on others according to degrees of indifference.

To prevent the infection of healthy animals by contagion, an ample supply of water and soap (Calvert's carbolic 20 per cent. in preference) is essential for the thorough cleansing of the operator's hands, instruments, &c., after each cow spayed.

Knife and hands could be further rendered aseptic by washing with an effectual antiseptic—

- (a) *Carbolic acid* 1 part, with 20 or 40 of water.
- (b) *Corrosive sublimate* 1 part, common salt $7\frac{1}{2}$ parts, water 1,000 parts.
- (c) *Zinc chloride* 1 part, water 80 to 100 parts.
- (d) *Sodium hydrofluosilicate*.—A recently discovered, effectual, non-poisonous, cheap germicide, used in proportion of 1 part to 500 water.

General Notes.

BONE SPAVIN.

THE treatment of bone spavin by firing and blistering is deprecated by an American veterinary surgeon, who adopts the treatment by what is known as resection of the cunean tendon. He states that this method is attended with less pain than the old style, and that fewer complications arise, whilst no ugly blemish is left. He tried it first as an experiment, considering that anything was preferable to the hot iron, and obtained good results. Since then he has had considerable experience with the operation, and finds it far superior to the old method of firing and blistering, more humane, and a more scientific mode of treatment for this old-time trouble. This operation can be performed without casting the animal. By the use of a small amount of cocaine, the parts become insensible to pain, the tendon can be taken up and a portion removed, closing the wound with a stitch or two, after cleansing it anti-septically. It readily heals. He considers with the experience he has had, and from what he has heard from others who have tried this treatment, cunean tenotomy will give better results in less time than any other for this trouble.

UTILISING LIMES.

THE lime grows to perfection in Queensland, but does not meet with so ready a sale as other citrus fruits. Those who have trees in full bearing cannot do better than dispose of the fruit in the shape of limejuice, which is very easily and simply prepared. The *Florida Agriculturist*, writing on the subject of the manufacture of limejuice, says:—"When limes are freshly squeezed, the juice is always very turbid, owing to the presence of mucilage and extractive matter derived from the fleshy part of the fruit. This is what makes it necessary to clarify it. The same difficulty occurs in lemons, but the yield of juice from lemons is much greater than that from limes; indeed, the yield from limes is very small, and the freshly expressed juice always contains a large amount of pulp. This, however, on standing for a few weeks, separates out, and a clear, sherry-coloured liquid (the true limejuice) is obtained, and can either be siphoned or decanted off. If time is no object, then the process of natural settling may be observed economically, but even then it is probable that upon storage the clear, sherry-coloured juice will get turbid, owing to the decomposition of mucilaginous matters which may still be in suspension. There are two courses open: Either treat the juice in the manner which we are about to describe, or else allow it to stand for a few weeks, and then treat the clear liquid which is obtained, using the same process in this case also. This process is very simple, and simply amounts to heating the juice to a temperature not lower than 150 degrees or higher than 160 degrees F. If the temperature is carried above this point, alteration will take place, and a noticeable flavour will be communicated to the juice. While the juice is still hot, it should be filtered, and almost any filtering medium will do. On the whole, we recommend crushed quartz, graded and arranged in the filtering vessel in such a way that the larger pieces are at the bottom of the vessel, while the smallest fragments are at the top. If this process is performed shortly after the harvesting of the fruit, the juice will, under ordinary conditions, keep good for twelve months. But if the juice is intended for exportation, then it may be prevented from decomposition, and rendered fit for transit, by mixing it with one-tenth of proof spirit. This is Schweitzer's recommendation. If the flavour, however, is not objected to, there is a cheaper method of preserving the juice after it has been heated and filtered, and this simply consists in adding 1 per cent. of bisulphite of calcium. When ready for the market, the specific gravity should be 1044.18, the percentage of citric acid should attain 8.66."

DANGER IN BEET-SEED.

Not long ago, says the *California Fruitgrower* (quoting the *Salinas Index*), Professor Duncan Stirling, while inspecting the growing crop of vegetables in his garden, came across a peculiar-appearing insect feeding on his beets. It seemed to be an entirely new species, and securing a specimen he sent it to Professor Hilgard, of the State University, for identification. The gentleman, it seems, was at a loss to place it, and later sent to Salinas, Professor C. W. Woodworth, who has been searching in various beetfields for more specimens. From the investigation which Professor Woodworth has so far been enabled to make, he is undecided whether it is a native insect or has come from Europe, where it does much damage to the sugar beets. If it be the European insect, it was probably brought over in the beet-seed, large quantities of which are imported into this country (U.S.A.) from Germany.

The pest is hatched from a minute white egg, which is attached to the beet leaf by a fly similar to a common house fly in size and appearance. The larva of the egg burrows between the layers of leaves, and soon attains a length of a quarter of an inch or more. After eating the substance out of the leaf, a chrysalis is formed, which falls to the ground, and from it, in due time, emerges the fly above mentioned. Professor Woodworth was to go to Watsonville for the purpose of investigating the beetfield there. Professor Stirling, who is an enthusiastic student of entomology, will continue the investigations at Salinas.

A NEW RACE OF SHEEP.

A SOMEWHAT peculiar experiment in sheepbreeding is at present being carried out by the Agricultural Department of the University of California, with the object of establishing a new variety of the domestic sheep from the produce of merino rams and Persian ewes. *Coleman's Rural World* gives no particulars as to the character of the Persian sheep, and does not even mention if it is a woolly or a hairy sheep. The inference is that the half-breds are to be bred together in the attempt to produce the new race. This is not regarded as the best combination to establish a new type. The next cross from either of the two breeds would give five-eighths of the sire's blood and three-eighths of the dam's blood, which is regarded as most likely to be more stable than the produce of half-breed. It is said that this combination has proved the most successful in establishing a race of hybrids between the goat and sheep. The experiment has not yet been carried sufficiently far to give definite results, but the indications are said to be promising. The objects sought in making this experiment are to produce a sheep with as good wool as the merino, and a carcass of mutton equal to that of the Southdown. Whether the Persian sheep used in this experiment is a woolly or a hairy sheep, the crossbreds will not yield fleeces anything like those of merinos, and here a serious defect is introduced which may not be possible to afterwards eradicate. A deal of time and care and money will be expended, says an exchange, in an experiment which, even if successful, will not give as good results as may be obtained by using one of the best breeds of British sheep, such as the Southdown, the Shropshire, or the Suffolk. The Agricultural Department of the Californian University might surely undertake some work of more practical value to the farmers of the country than this piece of fancy sheepbreeding.

USE OF PEACH-STONES.

IN the great fruit-canning centres of California immense quantities of refuse in the shape of peach-stones are found. These have hitherto been regarded as useless, but it has been discovered that they form an excellent fuel, and when burning give out greater heat than an equal weight of coal. Owing to this fact peach-stones can now be sold at 24s. per ton.

POISONING BY KAFIR CORN.

FEW are aware of the poisonous properties of Kafir corn at certain stages of its growth. It appears that the green leaf is the source of danger. When dried the plant is harmless, and even half-dried Kafir corn may be put into the silo and used with no detriment to the animals fed on it. From the *Cape Agricultural Journal* we extract the following from a correspondent to that journal:—

“Respecting Kafir corn and its poisonous properties, my experience has taught me that this plant kills quicker when it is at its best, and never had a scorching from the sun and drought, and, further, it is the leaves and not the stalk that does the mischief. As an illustration, I will mention a cow which got into a fine field just in bloom, and was dead the next morning when she had been eating the leaves—not a stalk eaten. I opened her, and there was not more than about 3 lb. of leaves in her stomach, a large quantity of greenish fluid, and a lot of dreadful smelling gas. Another, a huge slaughter ox, got into a field that had been gathered two months before, but had sprouted from the lower nodes or joints, and stood about 18 inches high; a few pounds of these sprouts killed him. My opinion is that a poisonous gas is generated when the juice from the leaves gets in contact with the acids of the stomach, and the only cure I know of, if taken in time, is a tablespoonful of carbonate of soda in a quart of water.”

SIMULTANEOUS IRRIGATING AND FERTILISING.

WHERE irrigation is practicable, the following practical idea might be carried out, especially in the case of vegetables, strawberries, &c. A Delaware (N.Y.) county farmer gives an account in *Farm and Home* of his combined irrigation and liquid manure distribution outfit. He raises the water from a creek by means of an hydraulic ram, and a 4 by 6 inch box pipe made of 2-inch pipe, and spiked together. About 10 rods of this pipe are laid in the bed of the creek, the lower end being attached to the upper end of the iron drive pipe, giving a fall of 5 feet from the inlet of the box pipe to the ram.

Near the ram on the highest bank, a tank is built of 100 barrels capacity. The top of the tank is 13 feet above the creek bed. A 1-inch discharge pipe, 16 feet long, carries the water from ram to tank. The ram fills the tank once in twenty-four hours. For irrigating two acres, about 60 rods of 1½-inch distributing pipe is used. From the tank, iron pipes are laid in various directions over the gardens. Every third coupling has a J with an iron plug to be unscrewed and hose attached. Water is distributed at night by hose or surface flowing.

Fertilisers are dissolved and fed direct to plants. He will experiment with nitrate of soda, and has used stable and poultry manure with good results. To prevent the distributing pipes clogging, a slatted box is built in one end of the tank; poultry and sheep manure are suspended in a wire frame. The main distributing pipe is covered with a strainer inside the tank.

He rotates his crops. He set one-half acre of strawberries each spring. These are fruited two years. Early in July (U.S.) potatoes are ploughed under, and winter celery set. The next year the same ground is set to early celery, and the next year to strawberries again. Cabbage and cauliflower are raised between the berry rows the first year. This plan provides for one acre of strawberries, one acre of celery, and one half-acre of cauliflower and cabbages each year.

Strawberry irrigation begins early in May (U.S.). Pipes are laid over the field 100 feet apart. Water is distributed through 75 feet of hose. To prevent the soil baking, a mulch is placed along the rows, and a narrow channel reserved for water. Each row is watered in turn. The manure is removed from the tank weekly, used as a mulch, and one or two one-horse loads of rotted manure applied. When irrigating celery, mulching between the rows is very important, as the soil should be kept cool and moist.

This plan of irrigation is almost identical with that adopted by the Horticulturist, Mr. Gorrie, at the Queensland Agricultural College with much success. The only difference consists in the simultaneous application of water and fertiliser. The scheme is well worth a trial.

POSITION OF EGGS DURING INCUBATION.

THE correct position for eggs during incubation is on their sides, with the large end slightly higher. When in this position, the chicks form in the large end, and at hatching time break the shell near the large end; if the small end is the higher, they are very likely to break the shell near the small end, and if they do this they are much more likely to perish in the shell, not being able to turn so easily to break the shell all the way around. The sawdust in the drawer or tray may interfere with the ventilation, or it may not, according to the construction of the machine. The eggs may be stood on end for the first five days, if turned twice daily, and then tested, when, the infertile eggs and those with dead germs being removed, there will usually be room in the trays to allow the good fertile eggs to lie on their sides.—*Exchange*.

PACKING EGGS FOR TRAVELLING.

No matter how carefully eggs are packed, they are very likely to get damaged by a long railway or coach journey. And more especially is this to be avoided in the case of eggs sent over the country for incubation. The sudden jolts they receive on a rough road or in a railway carriage often result in the loss of a whole sitting of valuable eggs. Only lately out of two sittings of valuable Plymouth Rock eggs sent to us by rail one resulted in three chickens and the other in five. Five more sittings which arrived in the same manner, over fifty-eight miles of rail, will probably fare no better.

Now, here is an idea which is doubtless of American birth, seeing that it mentions a "candy pail" and a "grocery store." We take it, however, that it comes through the *Australasian*, and it seems worthy of a trial:—"A regular egg-case is doubtless best for carrying eggs to market, but better than carrying them piled up one upon another in a basket is the plan shown in the cut. Get



a candy pail at the grocery store and cut from old paste-board a lot of circles, each one a trifle smaller than the other to go next above it in the pail. Put a layer of bran in the bottom of the pail, lay the eggs thickly over it and fill in between and over them with bran. Lay on a pasteboard circle and proceed as before. The storekeeper will take out each layer of eggs, lift out the circle with the bran on it, empty the bran into a box or pail. Then, when the eggs are all out, he will pour the bran all back into your pail, putting the circles on top, to be used again and again. Packed in this way the eggs will not break, though the horse trots and the roads be rough."

ECONOMIC PACKING-BOX FOR EGGS.

MESSRS. JAMES ROBINSON have conferred a boon on poultry farmers in the honeycomb box, which is a marvel of simple ingenuity. The bees know how to economise space for storing honey, and so does this box for storing eggs, more of which can be packed in a given space than in the boxes hitherto made, which are all arranged on the square. The cells are made from patent leather board, and between each layer is a piece of felt.

SPECTACLES FOR CATTLE.

Cows with spectacles are to be seen in the Russian steppes. The steppes are covered with snow more than six months of the year. The cows subsist on the tufts of grass which crop above the snow, and the rays of the sun on the snow are so dazzling as to cause blindness. To obviate this calamity, it occurred to a kind-hearted man to protect the cow's eyes in the same way as those of human beings, and he manufactured smoke-coloured spectacles which could be safely worn by cattle. These spectacles were a great success, and are now worn by upwards of 40,000 head of cattle, who no longer suffer from the snow-blindness which once caused such untold suffering amongst them.—*Exchange.*

HANDLING A VICIOUS BULL.

A CORRESPONDENT of the *Farmer and Stockbreeder*, writing on this subject says:—A very good plan for rendering a vicious bull harmless when in his stall is to fasten a surcingle round his waist, and then a three-quarter inch rope to his nose-ring, passing the latter between the horns, under the surcingle, and round the tail, as in the crupper of a horse. The rope can be kept between the horns by means of a cord tied to the horns themselves. In handling him it should be pulled tight until the nose is as high as his back, in which case he will be perfectly under control. Every bull of this kind kept for service should be provided with a pen some 30 feet by 60 feet in size, this having boards nailed to uprights in the inside, so that no mischief can be done. A stall large enough for him to turn round in should be placed in one corner, and at the feeding end a hole should be made through which he can feed, and thus the attendant will be saved the necessity of entering the pen any more than is absolutely necessary.

WHITE SPECKS IN BUTTER.

THE cause of white specks in butter is this: When the dairy wife skims the milk, a little of the milk is skimmed off with the cream. It is then probably allowed to stand too long in the cream-jar without stirring, when the milk becomes thick and settles to the bottom, and then begins to separate into cheese and whey; then, when it is churned, the cream is poured, thick milk and all, into the churn, and it is all churned up together, the consequence being that butter, butter-milk, cheese, and whey are obtained altogether, the butter and cheese forming one part, and the butter-milk and whey another part. Thus butter and cheese are mixed together, for such butter and white specks really are. To avoid this, never put any sour or thick milk into the churn with the cream.—*Farmer and Stockbreeder.*

KILLING FOWLS.

How best to kill a fowl is a question of importance, and one of the best plans is to tie the bird up by the legs, using soft cord for the purpose. If hung against a wall with the head level with the breast, it is very easy to manipulate it. The fowl is first stunned by a blow on the head, and then the windpipe severed with a sharp knife. The blood flows freely, and the action of the wings, which were left loose for this purpose, helps in this direction. In a very short time the muscular action ceases, and the bird hangs lifeless. This plan secures the proper bleeding of the fowl, and has certainly the advantage of preventing pain.—*Farmer and Stockbreeder.*

NEW SPECIES OF WILLOW.

THE willow-tree has found a congenial home in Queensland, more especially so on the Darling Downs, where it has by some been considered a sort of nuisance. But the willow is as useful as the osier for basket-making, and its light timber is put to various uses. There is a new species of this tree introduced from Asia Minor at the Chico (United States) forestry station of the Agricultural Department of the State University—the *Salix salmonei*. This tree is of remarkably rapid growth. In less than three years a small six-inch cutting attained the height of 32 feet, with a circumference of 52 inches and 12 feet in spread of branches. The willow we are acquainted with here will barely reach 10 feet in height in the same time with a girth of about 3 inches. We are not aware of the age of the willows at the Toowoomba railway gates, nor of those in the beautiful grove at Tenterfield; but had these been of the new variety, their size to-day would have been something stupendous, and probably they would have a good market value.

A NEW REMEDY FOR CHOKED CATTLE.

SOMETIMES a cow will get choked with an orange or mango or perhaps something else. It is always well to have something on hand with which to relieve the animal. There is nothing better than a good probang. Every farmer should have one. They are cheap, and will often save more than they cost in time and worry. The latest suggestion as a remedy is a peculiar one. Fine-cut tobacco is damped with molasses sufficiently to make it stick together, and a ball the size of a hen's egg is made. Now hold up the cow's head, pull the tongue forward, and crowd the ball as far down the throat as possible. In about a quarter of an hour it will cause sickness and vomiting. This relaxes the muscles of the gullet, and the object will likely to be thrown out.—*Farming*.

CASTRATING PIGS.

THIS operation should be performed when the young pigs are from six to eight weeks old. It is a good plan to feed them slightly for a few days before and a few days after the operation. The pigs generally do better if altered before they are taken off the sow. It requires two persons to perform the operation. The assistant holds the young pig between his knees with its back to the ground, or better on a carpenter's bench. Then he grasps a hind leg with each hand and presses the legs down on the belly. The operator presses the testicles out until the skin of the scrotum is tight. Then a quick cut is made with a very sharp knife. Some prefer to make a separate cut lengthwise for each testicle; others prefer to make only one cut crosswise. The opening should be only large enough to cut the testicle out. The covering of the testicle should then be cut, gradually worked back, the testicle gradually pulled out and finally cut off as close to the body as possible. Some men prefer to let the cut go without any dressing. Some use salt, but it is better to use a little clean lard.—*Farming*.

IMPORTED FLIES FOR POULTRY.

THE *Mark Lane Express* states that a company called the "Insectivora Food Company," in London, advertises a new food for poultry under the name of "Preserved Tropical Flies." This singular food consists of flies which swarm in some of the South American lakes, swamps, and rivers. They are taken by nets spread over the water at night; then they are dried, pressed, and sent over to England to feed British poultry. Even the eggs of the flies are collected. They are the size of poppy-seeds. These serve for chicken food. This sounds like a yarn, but the sedate *Express* does not publish anything which it has not verified. Therefore we may take it that the more the South Americans are cursed with flies, the more the Briton is blessed with spring chickens and eggs.

WHALE-OIL SOAP.

MR. A. H. BENSON, Government Fruit Expert, writes:—It may be interesting to readers of the *Queensland Agricultural Journal*, who are fruitgrowers, to learn that whale-oil soap of 50 to 80 per cent. strength can be obtained in Brisbane. Whale-oil soap is largely used in California for making kerosene emulsion, and also in conjunction with sulphur and caustic potash. The latter mixture is a good summer wash for San José Scale and for other scale insects. Hitherto this soap has not been obtainable in the colony that I am aware of.

A NEW HAY PRESS.

AT the Royal Agricultural Society's show at Four Oaks, Birmingham, Messrs. J. and T. Howard, of Bedford, showed a new power baling press, which is thus described by the *Mark Lane Express*:—

The chief improvement consists of a self-wiring apparatus, which can be tended by a small boy, whilst continuous pressure is now used, the old followers being done away with; it was certainly one of the finest presses in the showyard. More than one hay-cutter will have cause to praise their new press, the Leeming Smith patent, especially the double-action one. Instead of the old racket and chain business, and the men straining at a lever, all they have to do is to move a pump-handle up and down a few times, and the bale is pressed. The pumping or hydraulic arrangement is very effective, whilst the release action is instantaneous. The press is light, handy, and portable, and will doubtless be in great demand. The firm has also introduced a new cultivator for fruitgrowers, which by means of a couple of hollow steel disc-cutters, set at an unusual angle, will effectually cut off the runners of strawberry plants, and at the same time prevent their choking up the lines behind. It is evidently intended for shallow work, and for the use of market gardeners.

A PERFECT POTATO PLANTER.

MESSRS. RANSOMES, SIMS, AND JEFFERIES (England) have effected a great improvement in their potato-planting machine. They have also done away with the needle arrangement in their potatoes, and substituted for it a finger-and-thumb action, which is much simpler in construction than the needles; besides it does not pierce the potatoes in the hopper, but picks them up; it will also pick up a stray pebble or two instead of these disorganising the whole row, as was the case with the needles. It has a hopper and a disc on each side like the prize machines, but the discs are furnished with eight pairs of fingers or a "finger and thumb," which pick up and hold the potatoes as the disc revolves. A cam opens the fingers, and the potatoes drop into their places as though put in by hand. This implement seems to have now attained perfection, and will supersede much hand labour where considerable breadths of potatoes are planted annually.

A NEW CREAM COOLER.

MESSRS. JAKEMAN, FARRANDS, AND CO., London, have perfected a new cream cooler, the Kas, which is a spiral conical, so designed that the thick cream will not drop straight down, as is sometimes the case when these are made quite perpendicular. On this cooler each succeeding disc is greater in diameter than the one above it. Their new cream or milk warmer and cream pasteuriser were all constructed on these principles. They also entered a new milk filter adapted for small dairies, the principle being that of fluids finding their own level as the milk by its own pressure flows up through two filter beds of swansdown. It is rapid in its action.

DESTRUCTION OF ANT HILLS.

As the hot season approaches, those pests of the colony, the ants of all sorts and descriptions, become lively and begin to infest the houses, especially those of persons living in the country. On all sides the question is then heard: "How can we get rid of the ants?"

Several methods have been suggested, but few have been successful. We ourselves got rid of two extensive "antdoms" at Sherwood some years ago by covering the gravelly nests with chippings from the garden. This proceeding appeared greatly to trouble the insects, probably because the dry weeds prevented them from safely depositing the quantities of small stones and gravel they carry up from below.

Failing this remedy, there is another which we lately found in the *Telegraph* newspaper. It is worth a trial, so we reproduce it in the interests of our readers:—

The best method of dealing with ants in a large nest is to make several holes with a broom handle or iron bar to a depth of a few inches in different parts of their habitation. Pour into each hole about a tablespoonful of carbon bi-sulphide, and then cover the whole nest with a blanket. The heavy fumes of the insecticide will permeate the anthill, killing all insect life. The operation may be made more effective by exploding the vapour under the blanket with the aid of a light on the end of a pole. The latter procedure drives the poisonous fumes throughout the nest, rendering them more fatal to the inmates. The best time for this treatment is in the evening, when most of the ants will be at home.

DRESSED WEIGHTS OF EXHIBITION STOCK.

THE dressed weights of the prize stock shown at the late exhibition at Bowen Park were as follow:—

Messrs. D. C. McConnel and Sons, Cressbrook, champion ox, 1,620 lb.; hide, 76 lb.; caul fat, 50 lb.; and 20 lb. of suet around the heart. After being removed from the show this beast was kept for ten days, and probably lost 30 lb.

Messrs. D. C. McConnel and Sons, Cressbrook, three freezers; 1,020 lb., 980 lb., 940 lb. respectively; average, 980 lb.

Messrs. D. C. McConnel and Sons, Cressbrook, champion fat cow, 760 lb.

Barambah bullocks, 920 lb., 948 lb., 1,000 lb. respectively; average, 956 lb.

Messrs John Collins and Sons, three roan bullocks, 1,256 lb., 1,180 lb., 1,212 lb. respectively; average, 1,216 lb. Three freezers; average, 959 lb. Red bullock, second prize, 1,240 lb.

Mrs. Con. Taylor, Belleview, three red polled Angus cows, average 792 lb.

PLANTING COCOANUTS.

MR. THORNHILL WEEDON, writing on the subject of planting cocoanuts, says:—"I recollect when I was a new chum in the early sixties assisting in planting some cocoanuts under the supervision of an old West Indian planter, who placed them all eye downwards, giving as a reason that in a natural state the majority of those that grew were such as fell in that position. He also stated that if the nut was not buried the shoot would always seek the ground to root before growing upward. Those we planted mostly came up, but were subsequently destroyed by cattle, so that I can say nothing as to the final success of this method of planting."

PURCHASING MILK BY PERCENTAGE OF BUTTER FAT.

To reconcile the differences which exist between milk-suppliers and the factories with regard to the payment for milk according to the percentage of butter fat, a series of experiments is to be carried out shortly at the Hawkesbury Agricultural College by a committee of experts chosen by the council of the South Coast Agricultural Societies' Union. Many dairymen in New South Wales are greatly dissatisfied with the present system of calculating the value of milk on the fat percentage, and contend they should be paid according to the amount of commercial butter; but just how this is to be ascertained more accurately by any other method than the Babcock test has not been clearly explained by the discontented suppliers. Perhaps the experiments about to be conducted will throw some light on this important question, as well as lead to the adoption of a uniform standard for testing at all the factories in the colony. —*Australasian*.

EXPORT OF BUTTER TO LONDON.

THE first shipment of butter to the London market for this season from Sydney was made on the 3rd September, when 25 tons were despatched by the "Oratava." This is a large increase on the first shipment of last year, made on the 6th September, which consisted only of twenty boxes. The first boat in 1897, which took a shipment equal to the present consignment, was despatched on the 4th October, or just one month later, which fact serves to indicate that there will be a decided increase in butter exports for this season from New South Wales. —*Australasian*.

AGRICULTURAL AND HORTICULTURAL SHOWS.

THE Editor will be glad if the secretaries of Agricultural and other Societies will, as early as possible after the fixture of their respective shows, notify him of the date, and also of any change in date which may have been decided on.

LIST OF AGRICULTURAL, HORTICULTURAL, AND PASTORAL
SOCIETIES AND ASSOCIATIONS IN QUEENSLAND.

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Allora ...	Central Downs Agricultural and Horticultural Association	J. H. Buxton...	
Beaudesert ...	Logan and Albert Pastoral and Agricultural Society	M. Hinchcliffe ...	6 May
Beenleigh ...	Agricultural and Pastoral Society of Southern Queensland	Wilson Holliday ...	30 Sept.
Birthamba ...	South Kolan Agricultural and General Progress Association	G. W. Nixon ...	
Blackall ...	Barcoo Pastoral Society ...	F. Clewett ...	
Boonah ...	Fassifern and Dugandan Agricultural and Pastoral Association	J. A. McBean ...	28 April
Booyal Scrub	Booyal Progress Association ...	H. Masson ...	
Bowen ...	Pastoral, Agricultural, and Mining Society ...	J. E. Smith ...	8 June
Bowen ...	Preston Farmers' Association ...	R. A. Foulger ...	
Bowen ...	Proserpine Farmers' and Settlers' Association	G. W. Pott ...	
Brisbane ...	Horticultural Society of Queensland ..	G. K. Seabrook ...	21 and 22 April and 10 Oct.
Brisbane ...	Moreton Agricultural, Horticultural, and Industrial Association	J. Duffield ...	
Brisbane ...	Queensland Acclimatisation Society ...	E. Grimley ...	
Brisbane ..	Queensland Fruit and Economic Plant Growers' Association	G. K. Seabrook ...	
Brisbane ...	National Agricultural and Industrial Association of Queensland	H. C. Wood ...	10, 11, and 12 Aug.
Brisbane ...	Queensland Stockbreeders' and Graziers' Association	F. A. Blackman ..	
Brisbane ...	United Pastoralists' Association ...	Fredk. Ranson ..	
Bundaberg ...	Bundaberg Agricultural and Pastoral Society	A. McIntosh...	12, 13, and 14 Oct.
Bundaberg ...	Bundaberg Horticultural and Industrial Society	H. E. Ashley...	
Bundaberg ...	Woongarra Canegrowers' and Farmers' Association	H. Cattermull ...	
Burpengary...	Burpengary Farmers' Association ...	C. H. Ham ...	
Caboolture ...	Caboolture Farmers' Association ...	G. Mallet ...	
Cairns ..	Barron Valley Farmers' and Progress Association	W. F. Logan...	
Cairns ...	Cairns Agricultural, Pastoral, and Mining Association	A. J. Draper ...	28 and 29 Sept.
Cairns ...	Hambledon Planters' Association ...	E. Whitehouse ...	
Charleville ..	Central Warrego Pastoral and Agricultural Association	A. J. Carter ...	25 and 26 May
Charters Towers	Towers Pastoral, Agricultural, and Mining Association	W. Tilley ...	
Childers ...	Isis Agricultural Association ...	H. Epps ...	
Childers ...	Childers Progress Branch, Isis Agricultural Association	N. Rosenlund ...	
Childers ...	Doolbi Mill Branch, Isis Agricultural Association	W. T. H. Job ...	
Childers ...	Childers Mill Branch, Isis Agricultural Association	H. Epps ...	
Clermont ...	Peak Downs Pastoral, Horticultural, and Agricultural Society	F. Leysley ...	
Clermont ...	Peak Downs Dairymen and Settlers' Association	A. G. Pursell ...	
Cooktown ...	Cook District Pastoral and Agricultural Society	W. R. Humphreys ...	
Cordalba ...	Cordalba Farmers' Association ...	B. Goodliffe ...	
Currajong ...	Currajong Farmers' Progress Association ...	Wm. Howard ...	
Cunnamulla	South Warrego Pastoral Association ...	J. Winward ...	
Gayndah ...	Gayndah Agricultural and Horticultural Association	J. C. Kerr ...	
Gin Gin ...	Pastoral and Agricultural Society of Gin Gin	E. K. Wollen ...	
Gladstone ...	Gladstone Pastoral and Agricultural Association	W. J. Manning ...	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Gooburrum, Bundaberg Goondiwindi	Gooburrum Farmers' and Canegrowers' Association MacIntyre River Pastoral and Agricultural Society	W. J. Tutin ... A. Gough ...	14 and 15 Sept.
Gympie ...	Agricultural, Mining, and Pastoral Society	F. Vaughan ...	
Gympie ...	Gympie Horticultural Society ...	W. G. Ambrose ...	
Helidon ...	Helidon Scrub Farmers' Progress Association	M. Morgan ...	11 and 12 April 10 and 11 May
Herbert River	Halifax Planters' Club ...	H. G. Faithful ...	
Herbert River	Macnade Farmers' Association...	E. C. Biggs ...	
Herbert River	Ripple Creek Farmers' Association ...	J. W. Grimes ...	
Herberton ...	Mining, Pastoral, and Agricultural Association	John M. Hollway ...	
Hughenden...	Hughenden Pastoral and Agricultural Association	W. H. Mulligan ...	
Ingham ...	Herbert River Farmers' Association ...	S. Cochrane ...	3 Sept.
Ingham ...	Herbert River Pastoral and Agricultural Association		
Ipswich ...	Ipswich and West Moreton Agricultural and Horticultural Society	P. W. Cameron ...	6 Oct.
Ipswich ...	Queensland Pastoral and Agricultural Society	Elias Harding ...	1 and 2 June
Kalkie ... (Bundaberg)	Woongarra Canegrowers' and Farmers' Association	O. H. A. Kraak ...	
Kandanga (near Gympie)	Kandanga Farmers' Association ...	N. Rasmussen ...	
Kolan ...	Kolan Canegrowers' and Farmers' Association	C. Marks ...	
Laidley ...	Lockyer Agricultural and Industrial Society	John Fielding ...	27 and 28 July
Loganholme...	Logan Farming and Industrial Association ...	F. W. Peek ...	12 April
Longreach ...	Longreach Pastoral and Agricultural Society	J. P. Peterson ...	
Lucinda Point	Victoria Farmers' Association ...	W. S. C. Warren ...	
Mackay ..	Agricultural, Pastoral, and Mining Association	F. Black ...	27, 28, and 29 July
Mackay ...	Pioneer River Farmers' Association ...	E. Swayne ...	
Maryborough	Maryborough Horticultural Society ...	H. A. Jones ...	
Maryborough	Wide Bay and Burnett Pastoral and Agricultural Society	G. Willey ...	
Milbong ...	Milbong Farmers' Association ...	T. R. Garrick ...	
Mitchell ...	Mitchell and Maranoa Pastoral, Agricultural, and Vinegrowers' Association	H. J. Corbett ...	
Mosman River	Mosman River Farmers' Association ...	R. Thomas ...	
Mount Mee...	Mount Mee Farmers' Association ...		
Mount Morgan	Mount Morgan Mining, Agricultural, Poultry, Pastoral, and Horticultural Society	G. Orford ...	
Mulgrave ..	Mulgrave River Farmers' Association ...	Thos. Swan ...	
Nerang ...	South Queensland and Border Pastoral and Agricultural Society	W. J. Browne ...	
North Isis ...	North Isis Canegrowers' Association ...	W. J. Young ...	
Pialba ...	Pialba Farmers' Association ...	J. B. Stephens ...	
Pinbarren ...	Pinbarren Agricultural and Progress Association	H. Armitage, senr. ...	
Rockhampton	Central Queensland Farmers' and Selectors' Association	T. Whitely, Coowonga	10 and 11 May
Rockhampton	Central Queensland Pastoral Employers' Association	G. Mackay ...	
Rockhampton	Central Queensland Stockowners' Association	R. R. Dawbarn ...	
Rockhampton	Rockhampton Agricultural Society ...	R. R. Dawbarn ...	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Roma ...	Western Queensland Pastoral and Agricultural Association	H. K. Alford ...	10 and 11 May
Roma ...	Yingerbay Farmers' Association	F. E. Glazier... ..	25 Aug.
Rosewood ..	Farmers' Club	P. H. Adams... ..	
Springsure ...	Queensland Pastoral Society	G. R. Milliken	
Stanthorpe ...	Border Agricultural, Pastoral, and Mining Society	Geo. Simcocks	
Stanthorpe ...	Stanthorpe Horticultural and Viticultural Society	R. Hoggan	
St. George ...	Balonne Pastoral and Agricultural Association	T. M. Cummings	
Toowoomba	Darling Downs Horticultural Association	H. Hopkins	
Toowoomba	Drayton and Toowoomba Agricultural and Horticultural Society	H. Symes	
Toowoomba	Royal Agricultural Society of Queensland ...	F. Burt	2, 3, and 4 Aug.
Townsville ...	Townsville Pastoral, Agricultural, and Industrial Association (formerly North Queensland Pastoral and Agricultural Association)	J. N. Parkes	
Wallumbilla	Wallumbilla Farmers' Association	P. W. Howse	
Warwick ...	Eastern Downs Horticultural and Agricultural Association	J. Selke	
Wellington Point	Wellington Point Agricultural, Horticultural, and Industrial Association	J. B. Blaine	6 Aug.
Woombye ...	Woombye Fruitgrowers' Association	P. S. Hungerford	
Woowoonga	Degilbo Progress Association	F. A. Griffiths	
Woowoonga	Woowoonga Scrub Farmers' Association ...	H. B. Griffiths	

Statistics.

EXPORTS OF WOOL.

MESSRS. DALGETY AND Co. have forwarded to us the following interesting reports on the wool industry of Australasia :—

AMENDED AUSTRALASIAN WOOL EXPORTS

From 1st JULY, 1897, to 30th JUNE, 1898.

Compiled by Dalgety and Company, Limited.

—	1898.	1897.	Increase.	Decrease.	1896.
Victoria	389,045	444,257	...	55,212	461,606
New South Wales	637,052	690,774	...	53,722	685,083
South Australia... ..	116,592	153,751	...	37,159	179,576
Queensland	119,783	145,906	...	26,123	119,789
New Zealand	418,675	373,314	45,361	...	364,507
Tasmania... ..	13,199	13,613	...	414	15,837
West Australia	25,630	27,423	...	1,793	25,175
	1,719,976	1,849,038	45,361	174,423	1,851,573

DECREASE, 129,062 bales.

AUSTRALASIAN WOOL EXPORTS.

From 1st JULY to 31st AUGUST, 1898.

Compiled by Dalgety and Company, Limited.

—	1898.	1897.	Increase.	Decrease.	1896.
Victoria	7,909	6,353	1,556	...	10,656
New South Wales	27,301	21,891	5,410	...	26,965
South Australia... ..	1,033	1,226	...	193	2,697
Queensland	15,903	10,566	5,337	...	9,028
New Zealand	12,146	15,669	...	3,523	9,770
	64,202	55,705	12,303	3,716	59,116

NET INCREASE, 8,587 bales.

[The figures given above refer to deep-sea shipments from the various colonies only, no account being taken of wool shipped *via* Southern ports, but the total of combined Australasia is correct.—Ed. *Q.A.J.*]

Orchard Notes for October.

By ALBERT H. BENSON.

KEEP the land well cultivated, and, if dry, see that it is well stirred, but not turned. Attend to the disbudding of all young trees, for, if superfluous growths are checked now, they are converted into fruit-wood, and the vigour of the tree is thrown into those shoots which are to form the future branches of the tree. Disbud all vines, rubbing out all superfluous shoots, leaving only as many canes as the vine is strong enough to mature fruit to perfection on.

Sulphur all vines to prevent oidium, as, if there is any muggy weather during the month, this disease is sure to make its appearance. Where Black-spot is present, spray the vines with Bordeaux mixture, and if caterpillars are troublesome as well, then add 1 oz. of Paris green to each 2 gallons of Bordeaux mixture, and both pests will be destroyed by the one spraying. When using

Bordeaux mixture, there is no necessity to use sulphur for oidium, as the Bordeaux mixture answers equally as well. Don't spray when the vines are in blossom; but with varieties that are shy setters it is often a good plan to sulphur when in blossom.

The nursery should be carefully attended to; where not already done, the ties of all grafts should be cut and the scions should be trained so as to make a single upright stem. Where buds have been put in, they should be started by cutting back the stock sufficiently to cause them to grow, but the stock should not be cut hard back all at once, but by degrees, always leaving a portion of the stock above the bud to tie the young shoot to. Plant pines and bananas during the month, selecting suckers from healthy plants and from plants that are good croppers, and that produce good fruit, as a careful selection of suckers always pays well. Continue the treatment for Maori or Rust Mite of the orange recommended in the Notes for September; and where orange bugs, either the green or bronze, are present, destroy every mature insect that can be found, so as to prevent them breeding, as the killing off of the first crop will materially lessen their number for the season. Hand-picking, though slow, is probably the best remedy, though, before the insects are fully grown, large numbers may be destroyed by driving them on to the main branches of the tree and sweeping them off with a broom on to a cloth, from which they can be gathered and killed. Take every possible precaution against the fruit fly by destroying every infested fruit that you can. If there are maggots in cumquats or any other fruits, destroy every one, as the cleaner the sweep that is made of the first crop of flies, the less trouble there will be throughout the season. Where Scale Insects have been introduced on young trees into clean districts, every care should be taken to keep the pest from spreading; and in cases where the young trees are badly affected, it will pay the grower to destroy them at once, as the first loss will be the least. Where leaf-eating insects of any kind are troublesome—such as caterpillars of kinds, the larvæ of the fig beetles, or the false ladybirds that attack all kinds of cucurbitous plants, potatoes, &c.—they can be readily destroyed by a spraying of Paris green, 1 oz. to 10 gallons of water, with lime added in as large a quantity as can be got through the nozzle of the pump without choking, as this will tend to make the poison stick on better to the leaves, branches, or fruit.

Farm and Garden Notes for October.

By H. W. GORRIE,
Government Horticulturist.

It is now the springtime, and the careful husbandman saith unto himself, "Lo, I will plant vegetables for the summer"; and he straightway goeth and planteth pumpkins.

This, as a matter of fact, is usually what does take place, pumpkin and cabbage, and very often not so much as that, being the only vegetables grown on most farms. Why this is so, it is difficult to say. There are many good wholesome vegetables which can be grown during the hot weather, and they are just as easy to grow as the eternal pumpkin and cabbage.

Now is the time to sow beans, and of these there are many good varieties.

French or Kidney Beans can now be sown in all parts of the colony.

Lima Beans are a first-class hot weather vegetable. The hotter the weather the better the Lima bean likes it. Sow the dwarf kinds in drills 3 feet apart, and 18 inches between the hills, and the climbing kinds 6 feet each way.

Beetroot.—A few rows may still be sown. Cucumbers, marrows, squashes, melons, if not sown last month, ought to be planted at once. If attacked by leaf-eating beetles, spray with Paris green or London purple.

Chillies should now be sown in a seed-bed or box, and planted out when large enough. Set out egg-plant in rows 4 feet apart.

Peas.—A few rows may be sown, except in very hot districts.

Tomatoes.—These should now be ready to plant out, and this work should be done at once. Plant not less than $3\frac{1}{2}$ feet each way, and provide some means of support, such as stakes or trellis, for the plants.

Rosellas, if not already planted, should be set out without delay.

Weeds grow very fast now, and the hoe and cultivator must be kept constantly going.

When watering is necessary, do as much of it early in the morning or late in the afternoon as possible; and always stir the soil with the hoe the next day, to prevent baking.

Nearly all kinds of plants will be benefited by mulching during the hot weather.

FLOWER GARDEN.

Plant chrysanthemums, and see that they do not suffer from want of water; also look out for aphids and caterpillars.

Now is a good time to plant out palms and all kinds of tropical and semi-tropical plants. If the weather is very hot, water well after planting, and shade for a few days. Dianthus, snap-dragons, &c., can still be planted, and coleus should be now planted in the borders.

Roses should now be in full bloom. Keep free from aphids, and cut off all spent flowers.

Keep the borders well hoed, and the grass edgings trimmed. Get the lawn-mower out, and keep the grass down.

Do as much of your planting as possible now in dull or showery weather.

Cultural Notes for Tropical Queensland.

[The Cultural Notes for Tropical Queensland, kindly supplied by Mr. E. Cowley, Kamerunga State Nursery, are given a month in advance, for the obvious reason that the *Journal* cannot reach some parts of the far North until the month of issue is well-nigh over, and hence the monthly notes would be valueless until the following year.]

NOVEMBER.

PLANTING of bananas may be continued. Plant paddy, yams, turmeric, ginger, sugar-cane; apply stable, cowyard, or meatworks manures whenever available. Stake yams. Sugar-cane may be planted. Plant sappan seed and root plants. Olive hedges may be trimmed. Crushing sugar-cane continued. Pineapple crop must be taken off. Bananas and passion-fruit ripen all the year; the latter may be planted at any time, seed being used. Pawpaws (*Carica papaya*) and mangoes are fruiting. This is probably the most important month to Chinese farmers. The scrub has been felled and burnt-off, and planting operations of all kinds are pushed forward, trusting for the rain which oftentimes falls in thunder-showers—heavy at times. The Chinese deserve a word of praise for the persistent way in which they work the soil, and trust in Providence for the harvest.

Agriculture.

CROSS-BREEDING OF WHEATS.

IN connection with the experiments now being carried out by Mr. W. Farrar, wheat expert to the New South Wales Government, in the cross-breeding of wheats, the following article from the *Agricultural Gazette* (London) will be read with interest:—

MILLERS' REQUIREMENTS IN WHEAT.

CROSS-BREEDING OF WHEATS.

There are numerous varieties of wheat grown in Great Britain, as all agriculturists are aware, but there are a good many only known from the esteem they have gained locally. It must be borne in mind, however, that a good sample of wheat must necessarily depend upon the miller's judgment and choice, as he is the ultimate purchaser, independently of any name the variety may be called. But before we go into the question of the different wheats grown in this country and what kind of wheats the millers desire, it may be as well to describe the cross-breeding of wheats and its great importance in helping the farmers to improve the quality and yield of their crops. The ordinary practice on some farms is to grow one kind of wheat only, not because experience has shown that that variety is best adapted to the locality, but because it is generally produced in that part of the country. And, strange to say, in most cases, when a new wheat is sown—usually tried on an extensive scale—it is because samples of the grain have been well puffed by some seed merchant, or because some of it had been exhibited in the ear at a show in London or some other centre, and no attention is paid to the suitability of the soil. Experiments may be excellent means of getting enlightenment and making progress, but such trials ought to be made with a certain amount of discernment. It is well when selecting seed wheats not to be carried away by the fine outward appearance of the grain, or disappointment may follow. Take, for example, some of the wheats which are splendid in appearance, and all that could be desired in the field, and were so much sought after a few years ago, but, owing to their soft texture and deficiency in strong gluten, were worse than useless in the mill. Ambrose White, Kessingland, and San Salvator were wheats that, under average favourable circumstances, made a large yield per acre; but these wheats were most troublesome in the mills on account of their woolly nature, and the flour produced when made into bread did not improve, for the loaves were not only of a bad texture and colour, but many less in numbers per sack. Farmers must recognise the fact that the period has gone by in England when inferior produce could be profitably grown, and millers cannot now afford, on account of the severe competition in their trade, to purchase grain from their neighbours, the farmers, at a fraction above its real worth. It therefore behoves the English farmers to grow the choicest and most valuable kinds of wheat, from a miller's point of view, as the few shillings a quarter obtained over the inferior quality lots not only helps to level upwards the price of English grain, but tends to increase the demand for English wheats amongst millers, besides which such wheats are more readily sold than is the case with inferior sorts.

We are aware that season, independently of either soil or manuring, very much influences the composition of the grain even in one and the same description of wheat, and when grown in the same locality; but almost all varieties are capable of improvement under careful culture or by cross-breeding, which frequently makes the offspring better in quality and quantity for both farmer

and miller. Professor A. E. Blunt, who has given considerable attention to the cross-breeding of wheat, considers the whole operation very similar to breeding stock, and in regard to this point says: "The objects attained by crossing wheats, or hybridisation, as it is improperly called, are manifold. It improves the plant in various ways. It makes it more vigorous, less liable to the attacks of vegetable parasites; the straw is stiffer, better glazed, and more healthy; the leaves better feeders, as well as the roots; the glumes are more compact, and better filled; the heads longer, and fertilisation takes place more surely and successfully. Secondly, it improves the grain—makes it more plump, heavier, harder; consequently better suited to milling purposes; the bran is made thinner, more free from fluff and cellulose, the two obstacles which interfere so materially with milling; the grain is entirely transformed, being made to contain more or less gluten, starch, and other elements that make good flour." Sometimes the experimenter is compelled to cross and recross in order to fix type, and make a wheat that will suit both farmer and miller.

The writer has had the opportunity of assisting at the carrying out on an extensive scale of experiments in the cross-breeding of wheats, and some very remarkable results were obtained. The cross-breeding of wheat entails a great amount of increasing personal attention, owing to the very short period during which the work can be successfully accomplished, great care, and indefatigable patience; and, in the experiments at which the writer assisted, entirely new sorts of wheat were developed. To give your readers some idea of the exceedingly difficult and slow nature of the work involved in the process of "crossing" wheats, it may be as well to offer a short account of how the operation is effected. As we already know, the reproduction organs in the floret are so well guarded that they are practically shut out from any other crossing, and the only way in which an artificial cross can be obtained is to open the case of the floret protecting the flower, which is a very delicate operation, requiring considerable perseverance and skill. A fine judgment must also be exercised to catch the ears of wheat just at the right time in relation to temperature, and it is a remarkable feature in all wheats that it is only at a proper temperature of the atmosphere—namely, about 70 degrees F.—that the flower will afford the necessary opportunity for fertilisation. Having selected a well-developed spikelet in an ear of wheat, the outer awns of the outer floret are taken fast hold of between the index finger placed beneath and the thumb above; then pressing with the cushion of the middle finger upon the base of the spikelet in such a way as to impress a slight see-sawing motion, which allows at the same time of fixing the floret firmly between this finger and the index finger. By this movement the external glume of the floret is curved outwards, and should the lodicules be swollen out, as artificial fertilisation cannot be effected until this stage in the growth of the flower is reached, the floret will easily be opened with the slight persuasion of a needle. Their production organs are divided into the pistil or female portion of the flower and the stamen or male. The pistil consists of the ovary, the style, and the stigma, and the stamen comprises the filaments, anthers, and pollen. After having opened the floret, a very fine pair of forceps is necessary to remove to one side the curtains attached to the outside edge of the inner glume in order to remove the three stamens, which is done by extracting them one by one by seizing hold of the filaments a little below the anthers. The stamens are removed, while still green, although near maturity, and on the following day the pollen from the anthers of another variety, which it is intended to use as the male parent, is poured gently on the feathery stigma. The envelopes or glumes of the floret are then gently pressed together again and carefully watched, so that some few weeks after, when matured, they can be carefully gathered, thus preventing any possible accident happening.

The results, however, of each operation involve a succession of further operations, for in practice we find that the products of cross-fertilisation with the same ear of wheat in each "breed" selected do not come alike, nor have

the progeny in a second season been more persistent. To the cost of cross-breeding has been added the infinite trouble of continual selection and yearly breeding, so as to secure a thoroughly fixed character of the very best form. From numerous experiments it appears that something like a fixity of type can be relied on in the fourth season. But until then the sporting tendencies of the cross-bred grain are very remarkable. Sometimes in the second and third generation a full-bearded variety of wheat will spring from grain of which there has been the faintest possible trace of bearding in the immediate parentage, while other sports are partially or in some few cases wholly sterile.

OBJECTS OF CROSS-BREEDING WHEATS.

On the Canadian Government Experimental Farms, the cross-breeding of different wheats from every country in the world has been carried on in order to procure a type of wheat similar to the well-known kind known as Red Fyfe in the north-west, but which would ripen earlier than Red Fyfe so as to escape being frosted. Previous to these experiments wheat, going under the name of Ladoga, was purchased from St. Petersburg and distributed as seed amongst the Canadian farmers, as it produced a grain very like Red Fyfe, but ripened sufficiently early to escape the frosts. However, this wheat was condemned by the Canadian millers, as it did not produce such a strong flour, and at length was discarded by the farmers. In England, in spite of the apathy of the Board of Agriculture in this direction, seed-growers have carried out a large number of experiments, and produced vigorous wheat plants of distinct types. The object of the English seed-growers has been to develop the ear, so as to get a larger yield per acre, and to make the plants hardier in order that they might resist disease, without paying any attention to quality of gluten. It seemed to be the rule that the greater the antiquity of a crop, consequently the more artificial the conditions under which it was grown, the more liable did it become to the ravages of parasitic pests, both insect and fungal. In fact, it is believed that no crop is grown in the world which has so many insidious foes working against it as the wheat crop. We can easily understand why seed-growers desire to "cross" wheat in order to lengthen the wheat ears of a crop, and so get a greater number of grains per acre, from the very singular fact, pointed out by Major Hallett in the autumn of 1881 in the *Nineteenth Century*. He states:—No matter what the quantity of seed sown, the number of ears of wheat produced per acre is, in the absence of injurious circumstances, virtually the same—about 1¼ million, the different quantities of seed having been sown each under the best conditions of time and space.

DRILLED.

1873.	Quantity per acre.	Ears on a square yard.	Ears on an acre.	Counted 1874.
11th October	1 bushel	263	1,272,920	June 4.
11th October	2 "	283	1,369,720	
End of 11th October	2 "	265	1,282,600	
3rd November	3 "	269	1,301,960	
	2 "	270	1,306,800	At harvest.
		5) 1,350	5) 6,534,000	
		Aver. 270	1,306,800	

PLANTED.

September	{ 1 1/4 bushel in single grains 9 in by 9 in. }	276	1,335,840	June 4.
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In a bushel of ordinary wheat there are some 700,000 kernels, or in a crop of 40 bushels 28,000,000, which, upon the number of ears produced per acre (see table), gives about 22 grains as the average contents of the present ear. By cross-breeding certain varieties of wheats quite a marvellous result is obtained, for not only are the kernels larger, but the wheat ears are extended in size, and the number of grains is multiplied. It is to be hoped that farmers and seed-growers will after this turn their attention to cross-breeding wheats with a view of producing a grain containing strong gluten. And in this connection it should be remembered that the nutritive value, as far as this is dependent on its fitness when ground into flour to lay on muscle in the human body, is principally determined by the amount of gluten or albuminous matters it contains.

TUBERCULOUS CONSUMPTION AND FARMING.

By HENRY A. TARDENT,
Manager of the Biggenden Experiment Farm.

It is usually considered that few professions, if any, are more healthy than farming, and, to a certain extent, it is so. It would be still more so were the laws of hygiene better known and more rigidly observed on the farm, which, unfortunately, is seldom the case. Not long ago my worthy friend, Mr. Fred. Wills, of the Department of Agriculture, attracted in this *Journal* the attention of farmers to the serious dangers they are exposed to from hydatids. To most readers—including myself—that excellent article was a revelation, and I have no doubt many a father has in consequence of it given a word of warning to his children.

I would like in the following lines to make everyone in Queensland acquainted with the serious dangers attached to the neglect—on the farm and in the home in general—of precautionary measures against a most insidious disease which is at the present time making considerable headway amongst us: I mean consumption.

The question has been repeatedly reiterated and discussed in the newspapers of the colony, but in a somewhat desultory manner. Doctors themselves seem to be far from agreeing in their opinions, some believing that a sanatorium for consumptives can be established with impunity in the midst of a populous city, whilst others consider that five miles should be the shortest distance allowed between a sanatorium and a populous centre. The writer of these lines was born within a few miles of one of the largest existing sanatoria (Leysin, in Switzerland), and thus happens to have had opportunities to become acquainted with the question. In addition he has received from a friend in Switzerland a most interesting pamphlet on tuberculosis, written by Dr. Sonderegger, who is probably the best living authority on the matter. That pamphlet can well be considered as summing up for the reading public the present state of our knowledge of that disease and its cure, in a country which has so far done most to prevent and cure it.

It is now intended to translate the pamphlet in a condensed form, leaving aside, of course, some dry statistics and everything of too local a character to be of use to us.

Tuberculosis is infectious, avoidable, and curable. Such is the epigraph of the pamphlet.

When the bacilli of tuberculosis, which were first discovered by the celebrated Dr. Koch, of Berlin, are inoculated to the healthiest of animals, they invariably produce in them tuberculous consumption. The same happens when animals are made to inhale dust formed from the sputum of consumptive patients. The same has happened also with very strong men who had not been cautious enough in their relations with consumptives. Not seldom many cases follow each other in families which had previously been quite free from it. We know of houses and prisons, all the inhabitants of which have become consumptives. There are also stables and cow-sheds where tuberculosis is so

implanted that it is very difficult to eradicate it. It attacks there not only the animals but the men also who look after them. Wardsmen and hospital nurses are more exposed to tuberculosis than to cholera, and they pay a heavy tribute to it. The necessary preventive measures are not seldom voluntarily neglected without doing any good to anybody, and leading to a premature grave not only a nurse or a doctor but also a devoted mother, a wife, or a sister. In this disease, infection causes more deaths than heredity. In standing armies more men die of tuberculosis than in the same number of the civil population, although the former are composed of the strongest and healthiest men of the nation. The safest places appear to be houses and hospitals for consumptives, where absolute cleanliness and minute precautions are observed.

In six well-kept roomy wards, full of tuberculous patients who used to expectorate exclusively into Detweiler's spittoons, Dr. Cornet could not discover a single bacillus of tuberculosis, whilst he could always find some in other places.

The same may be said of orphanages. Although in these, a great number of the children—about 50 per cent.—were born of consumptive parents, the death rate from consumption is inferior to that obtaining amongst the rest of the population.

The manner of living is also more important than heredity. It is groundless to be afraid of the breath or perspiration of consumptives. The most ordinary medium of infection is the expectorated sputum. If the consumptive expectorates on to the earth or on to the floor, the sputum dries up and the solid matter turns into dust, the minute particles of which fly about in the air. If these happen to be inbreathed by another person, the bacilli they contain implant themselves on the warm and humid surfaces of the respiratory organs, and not seldom find there a most propitious field for their development and multiplication. Amongst dangerous places we may reckon ill-kept, dusty schoolrooms, hotel bars, railway carriages, &c.

Linen is also often a source of infection. Some patients expectorate into their handkerchief. The matter dries up, turns into dust, and becomes an active agent of infection. Bed-linen is also often the seat of numerous bacilli, which can become very dangerous if the linen be not carefully washed.

Infection by means of food is not so frequent. Still it obtains, especially with children and infants. *Milk* is then the usual channel; more seldom, meat. The number of tuberculous cows varies (in Switzerland) between 2 and 20 per cent., and their milk is then nearly always contaminated. (For Queensland there are no statistics available yet, but it is well known that many dairy herds are infected, and still more of the so-called city cows.)

It has happened that whole families, and at least in one case a whole boarding-school, were infected by the milk from tuberculous cows. For that reason no milk should be used, on any pretext whatever, without having been first boiled. Goats' milk is much less dangerous, those animals being seldom subject to the disease. Butter can also contain large quantities of tuberculous bacilli. Separated butter contains them—as a rule—in smaller quantities than hand-made butter. A farmer's tuberculous wife can contaminate the cream by simply (as is not seldom done) blowing with her breath over the cream of a milk-dish. Properly speaking, tuberculous meat is dangerous only when eaten raw or underdone. Still, it should never be sold nor fed to pigs, as these latter are very liable to contract the disease.

Another very active agency of disseminating the disease is the common house-fly. The bacilli stick to their slimy legs as dust does to our boots. We have all seen them feeding on the most nauseous materials, and then walking over appetising dishes. This is another reason why we should use in our houses only closed spittoons of the Detweiler's type.

If we could keep in check the bacilli of tuberculosis as the surgeon does the bacilli of suppuration, nothing would be easier than to preserve ourselves from tuberculosis. Unfortunately, we cannot but admit that we are

often exposed to inbreathe the so-called Koch's bacilli. True, most of the bacilli expectorated by consumptives are mere corpses; but a patient expectorates millions of them in a day, and amongst them there are sure to be some virulent ones. Some recent investigations seem to prove that even when dead the bacilli remain poisonous, although being, of course, deprived of the faculty of multiplying. *Post-mortem* examinations show that about one-third of the examined corpses bear more or less cured traces of tuberculous lesions. Many of those who were so temporarily attacked, and then cured, never suspected it. Those who died from it amount to about only one-seventh of all examined corpses.

If one-third of the examined corpses bear traces of tuberculosis, and only one-seventh of the deaths were caused by it, it necessarily follows that four-sevenths of the persons affected with tuberculous consumption get cured of it, so that the disease is not necessarily fatal, as is thought by many people.

Hereditary or acquired bacilli develop and multiply in inverse ratio to the general state of the body's health. All that weakens the body (think of that young men!) renders it more liable to consumption. General weakness, precocious depravity, vicious habits, exhaustion from disease, or, for women, from frequent confinements, habitual drunkenness, alcoholism, misfortunes, sorrows, and misery are all predisposing causes. The characteristics of poverty are hunger and filth, which weaken the body, and render it liable to contract all infectious diseases, such as typhoid fever, cholera, and tuberculosis.

Improved water supplies, wide airy streets, the pulling down of old unhealthy buildings, and other similar works, undertaken in many cities with a view to fight typhoid fever, have resulted in a diminution of tuberculosis as well. A foul air is the kind of uncleanness most likely to occasion tuberculosis. That explains why all beings of sedentary confined habits are the most subject to it; such, for instance, as the high-life lady, the office clerk, the prisoner in his cell, the lion and monkey in their cages, as well as the cow kept in a stable. It is eminently a prisoner's disease. A man condemned to ten years has fifty chances in 100 to die from tuberculous consumption.

As showing the influence of the *profession* on the spread of the disease, Dr. Sonderegger quotes the following table compiled by Kummer:—

From 1879 to 1882, on 1,000 deaths from tuberculosis—

Railway employees furnished	12·57	Bootmakers	...	...	...	29·03
Farmers...	19·80	Butchers	...	...	...	31·37
Weavers in factories	21·42	Coopers...	...	...	...	32·80
Doctors	22·97	Bakers	...	...	...	33·34
Carpenters	24·84	Watchmakers	...	...	...	35·19
Engineers	25·12	Printers...	...	...	...	36·46
Publicans	25·80	Teachers	...	...	...	39·40
Millers	27·01	Stonehewers	...	...	...	68·75
Chemists	27·74					

I cannot help thinking that a table giving the ratio of deaths per 1,000 inhabitants engaged in one of the above professions would change considerably the order in which those professions are placed in this table.

CURE.

Once we are acquainted with the predisposing and occasioning causes of tuberculous consumption, it can be guarded against as well as any other disease, if, notwithstanding that it has declared itself, we still can oppose to it powerful and efficacious therapeutics.

When a farmer happens to be possessed of a land swampy and full of weeds, he does not attempt to pull out these latter one by one. He drains and manures his land—so says Dr. Sonderegger—to improve it, and thus modify the conditions of vegetation. We proceed in the same way in our fight against tuberculous consumption. We try to improve the soil; I mean the patient. We make him sanguineous, strong, and fat by providing him with good food and a healthy hygiene.

For that purpose I do not know of anything comparable to the grape cure (by following which a lady gained 20 lb. in weight in three weeks' time in the Roma district—H.A.T.) When the weight of the patient increases, it is a good sign; when it decreases, it is a bad sign, whatever may be the other symptoms.

To attain that end many obstacles have to be removed: dyspepsia, fever, hemoptysia, inflammations, nervous sur-excitation or apathy, and also undesirable moral influences. The consumptive patient is seldom in a well-balanced moral state. He usually oscillates between exaggerated optimism and pessimism. The physician must display great patience and prudence, but act also with firmness. Not unfrequently he will have to make use of chemical remedies and hydrotherapia.

For centuries past it had been remarked that a sojourn in a mild, uniform climate had a beneficial effect on consumptive patients, provided they could live in the open air. Gradually it became a sort of fashion to send such patients to all places renowned for their beauty and good climate. In recent years, however, it has been found that climate could not do much by itself. The inhabitants of Madeira, of the Riviera, also those of the city of Mexico—which is situated at an altitude of 2,280 metres (7,524 feet)—are very much subjected to tuberculous consumption. A methodical, rational hygienic treatment has more influence than any climate. In consequence of that confirmation, sanatoria were established on the coasts of England, of France, Italy, and on the hills of Germany. The results proved to be very encouraging.

In 1885 a young country physician, Dr. Spengler, then residing at Davos, a high valley in the Swiss Alps, had remarked that many of the inhabitants who had become consumptives in foreign lands would quickly recover by spending *a winter* in their native village. He induced a couple of his friends who were affected with the disease to try a sojourn with him at Davos. The season presented the usual characteristics of winter on high mountains. The air was cold in the shade, but warm and enjoyable in the sun, quite pure, invigorating, and exciting appetite. They both recovered. The fact becoming known, they were soon followed by others, and now Davos has become the largest sanatorium for consumptives in the world, and more than 2,000 patients enjoy there all the resources of medical science and hygiene. Soon after the arrival of the patient the cough diminishes, fever abates, appetite increases. Improvements and complete cures are there much more numerous than in sanatoria situated on plains and in valleys. Other similar stations have been established at St. Moritz, at Arosa, and more recently, on a large scale too, at Leysin in the Canton de Vaud. The figures of those sanatoria are summed up thus by Spengler:—

Complete cures ...	32 per cent.	Improving, 14 per cent.
Still under treatment, 19 ..	„	Deaths ... 35 ..

The curative effect of a mountain climate seems to be intimately connected with the influence exercised by altitude on the composition of the blood. In 1889 the celebrated French scientists, Paul Bert and Viaut, discovered that the number of red globules in the blood, which is from 4,000,000 to 5,000,000 per cubic millimeter in people living on plains and in valleys, increases to from 6,000,000 to 7,000,000 in people who live in higher altitudes. That increase in the number of globules seems to be due to the rarefaction of the air to which it is proportional. It results in an increase of weight and strength which usually ensures a cure.

To sum up, we can avoid tuberculosis by fulfilling all the conditions of a strict hygiene, pure air, a clean abode, pure water, food sound and in sufficient quantity, in reasonable proportion of work and rest, and, above all, good morals. Any infraction of these rules is sure to be felt sooner or later. To cure consumption, we must fortify the constitution by all available means. Climate alone is of no avail if not supplemented by intelligent therapeutics. A patient well cared for on the plains has more chances to recover than one left to himself in the healthiest of mountain climates.

A Swiss Federal Commission of medical men formulated in 1893 the following recommendations :—

1. A sanatorium for consumptives ought to be a secluded establishment, supervised and visited every day by a medical man.
2. The strict observation of hygiene and medical precautions are of prime necessity.
3. A place in a high altitude, all other things being equal, has to be preferred before all others.

NOTE.—Dr. Sonderegger's pamphlet concludes with a description of an ideal building for a sanatorium, which we omit as not being of any instructive value to a rural population. The foregoing, however, is of vital interest, and cannot be too widely read.—Ed. *Q.A.J.*

CURING CIGAR TOBACCO.

By R. S. NEVILL,
Tobacco Expert.

GROWERS of tobacco should bear in mind that the housing and curing of a crop is the most important of all the work done; and that drying tobacco is not curing it. It should be allowed to ripen well before cutting, and the aim should be to so regulate the planting that not much time will elapse between the harvesting the first and the last of the crop. (*See article on cultivation of tobacco.*) The importance of this will be recognised when it is known that different stages of the curing require different treatment, and tobacco cut at different times will require a different treatment at a given time, which cannot be given unless you have a number of curing-sheds.

A short time will not seriously affect results, but two or three weeks elapsing between the cuttings may be serious. You can tell by the thickening of the leaf and brown spots appearing on it when the tobacco is ripe; also by folding the leaf, it will break; but the farmer that carefully watches his crop will detect the first signs of ripening.

It is best to do the cutting after 3 p.m., when the sun is not so hot, unless the day be cloudy and cool, when it may be cut at any time; but never cut or handle tobacco when it is wet with dew or rain. A hard rain will wash the gum off, and unless the tobacco is very ripe it is best to let it stand a few days to again gather gum after such rain, but if it is very ripe it is best to continue cutting as soon as it has dried off. Splitting the stalk is not usually practised in cutting cigar tobacco. Many methods of gathering the crop are in use in the United States, but that most commonly practised is what is called stalk curing, and it is not a settled fact that other methods are better, except where the plant ripens unevenly.

Take the stalk in the left hand, near the middle, and bend it over slightly, and with a quick stroke cut it off 2 or 3 inches above the ground. Lay the plant down carefully with butt to the sun, being careful not to bruise or break the leaves. When it has wilted, so as to be handled without breaking, it should be taken to the shed and hung. If hauled in the cool part of the day, it may be laid carefully on a board-bottom frame, butts out and tails lapping, but should be taken to the shed at once and taken off the wagon, and hung, as it will heat if left on too long, and ruin the leaf. Two methods are practised in hanging. Some use a spear, hollow at one end to fit over end of stick, and thus push the spear through the stalk 4 or 5 inches from the butt, and passing it on over the stick, and when full remove the spear and put it on another stick, and so on. Others use a string, tying the plant to the stick. Do not tie two plants together, but tie each separately, first on one side of the stick and then on the other, about 6 or 7 inches apart. If you tie two together they press against each other, and you are liable to have pole-burn if the weather is damp. The sticks of tobacco when placed in the shed should be about 12 inches apart, so that the plants will scarcely touch each other. The curing-shed should be so

arranged as to make it very open or very close as desired, with ventilation at top and gables; the gable windows hung upon pivots, so as to be opened or closed as desired; also openings on sides, extending from base board to eaves, and base board hung upon hinges, so as to be lifted up and give bottom ventilation to create currents of air when other openings are closed. By this means you can create light currents when not too much is needed—doors in the ends of the shed. For the first ten days or two weeks after the housing the shed should be kept open, unless you have hard and very drying winds, in which case the windward side should be closed to prevent too rapid drying. After this the shed should be kept closed during the day if the weather is drying, and open at night if the weather is not damp or foggy. The idea is to keep the leaf in a moderately soft or pliable condition during the curing process, and never letting it get dry and harsh; and sometimes it is necessary to sprinkle the floor to prevent this. On the other hand, it should not be allowed to get wet, or it will rot; but keep the air in the shed moderately moist, and thus keeping the tobacco-curing at a uniform rate all the time. If there should be a continued wet spell, and there is danger of the tobacco getting too soft, it is then well to have a heating stove with pipe running outside, and build fires just enough to keep the air at a proper humidity, being careful not to get it too dry. If the wet weather continues only for a day or two and then turns off drying, open your shed until it has dried out, and then proceed as before. During the last stages of the curing, light should be excluded, as strong light will injure the colour. With these instructions you must use your own best judgment as to how to proceed under any special conditions. The time required to cure a shed of tobacco is from eight to twelve weeks, depending upon the season.

Stripping or handing up should not begin until the stalk and stem are thoroughly cured, and in taking down the tobacco for this purpose it should be done when the tobacco is coming in condition, and *never* when it is drying out. If it gets too soft, then let it alone until it dries out completely, and you get another season. When tobacco is drying out you cannot tell its proper condition, as the stem is likely to be surcharged with moisture; and when put into bulk, this is distributed back into the leaf, and the tobacco gets too soft and will damage. The proper condition for cigar tobacco is when the leaf is pliable, and the stem just soft enough not to break in working; when in this condition it is ready to strip and bulk. In assorting, put leaves of same colour and same length together; put those perfectly sound, partly sound, and the inferior each in a class to itself. In packing the tobacco down to be sweated, put it on a raised floor, having the floor tight, that no dampness may penetrate. A end of bulk have double row of boards to bulk against. In bulking, make two rows, heads out and tails lapping in the middle 5 or 6 inches; cover over the bulk well, and put on weights to press it down; watch it carefully, and see that it does not get too hot; if found to be getting so, shake out and rebulk, but this will be unnecessary if condition is made right at the start. After it has been in bulk four or six weeks, it should be then put into boxes and well pressed down, leaving a space of 1 inch between the butts and the end of the box. Pack heads towards end of box, and tails lapping in centre. A box 3 feet 8 inches long, and 28 inches square at end, should hold 350 lb. to 400 lb. Do not squeeze up the tobacco in the hand, either in bulking or packing boxes.

MARKET GARDENING.

IN this issue we commence a series of articles by Mr. H. W. Gorrie, Horticulturist at the Queensland Agricultural College, on the subject of market gardening. These articles cannot fail to prove of great interest and value, not only to amateur gardeners, but also often to professionals, as they are the outcome of many years of practical experience.

ON MARKET GARDENING.

No. 1.

By H. W. GORRIE,
Horticulturist, Queensland Agricultural College.

THE SITE.

In selecting the site of a garden there are four essential points to be considered—namely, water, soil, aspect, and shelter. Of course in growing garden stuff for sale there is also the question of convenience to rail and market to be taken into account.

I have placed water first in my list of essentials, because to attain any degree of success in gardening a good water supply is an absolute necessity. As a rule, the best situation for a garden is on the bank of the creek, or near a lagoon or waterhole; but if none of these are available then you had better sink a well in your garden, for *water you must have*.

True there may be months and months during which no watering will be required; but it is quite certain that sooner or later a dry spell will come, and then, if no water is to be had, you will probably lose the result of months of labour, and perhaps, as in the case of valuable fruit trees, of years.

Therefore, above all things, be certain that, whether you are going to plant twenty acres or only one, you will be able to command a sufficient supply of water in time of need.

Now as to soil—

THE SOIL.

In the first place you may be assured that you cannot have soil too good for gardening; but at the same time, if it is impossible to obtain very rich soil, a liberal and judicious use of manures will ensure the same results, although, of course, at some additional expense. For plants of the Brassica family, such as cabbage and cauliflower, which are greedy feeders, you *must* have rich soil; and, if not rich naturally, it must be made so by liberal manuring.

The deep alluvial flats commonly found near the banks of many of our creeks and rivers are ideal soils for this class of produce, being, as a rule, very rich in humus, and containing all the elements necessary to produce high-class vegetable crops.

A light sandy loam is better for such crops as onions, carrots, &c.; but as it is not always possible to get several kinds of soil within the limits of a garden, it follows that the soil must be made, as far as practicable, to suit each different crop by varying methods of treatment and manuring.

In locating the garden it is well not to have it too far from the dwelling; in fact, if the house is *in* the garden so much the better.

As to aspect, if the garden is on a slope, the fall should be to the east; but a level site is preferable, as level ground can be more easily and economically worked than a slope; and there is not the danger of both soil and crops being washed away during heavy rains, which is always to be feared when the garden is on a hillside. Then, if possible, the garden should be protected from the prevailing winds by a ridge or a belt of timber.

In clearing scrub lands for a garden it is advisable to leave a belt of trees standing on the side from which the prevailing winds blow. This belt should be two or three chains wide, and not sufficiently close to the garden to interfere with the free access of light and air to the plants.

If no natural shelter exists, it is advisable to plant a belt of such trees as camphors, silky oaks, or loquats on the exposed side.

This belt should consist of two or three rows of trees; the trees in the rows not being all in one line, but alternating with each other. This mode of planting breaks the force of the wind more effectually than straight rows. It is, of course, impossible to obtain a garden site fulfilling all the conditions you would like; but get the best you can, and then try to supply yourself what Nature has left out.

PREPARING THE LAND.

In preparing the land for gardening, I should recommend deep working to begin with. Get down 15 or 18 inches with a subsoil plough if you can. The advantage of deep working will be chiefly apparent in a long spell of dry weather, when plants in deep soil will be found to grow and thrive, while others in shallow soils will require constant care and watering to keep them alive.

Having thoroughly broken up your land, the next step is to mark it off in sections for various kinds of vegetables, trees, &c. This will be largely a matter of convenience and circumstances, as no hard-and-fast rule can be laid down, but always bear in mind that even in a small garden horse labour is cheaper than hand labour; therefore, arrange things in such a manner that as much of the work as possible may be done by means of horses.

In this connection, I would say, never sow garden crops of any kind *broadcast*. This is an obsolete custom which should have been done away with long ago.

Always sow or plant in rows, and have the rows far enough apart to enable you to use either horse or hand cultivators between them. By following this system it is easy to keep the ground clean, and also to keep it open, and conserve the moisture by cultivation—a thing which cannot be done where crops are sown broadcast.

This broadcasting of garden crops cannot be too strongly condemned; as it is wasteful, untidy, and unprofitable, except to the seed-sellers, who are the only people benefiting much by it.

DROUGHTS, INSECT PESTS, AND THEIR USES.

HOWEVER much we may deplore the losses sustained by farmers, stock-owners, and fruit-growers, due to long-continued droughts, to floods, and to the thousand-and-one insect pests, which the Department of Agriculture is putting forth all its strength to, if not eradicate, at all events to minimise in their effects, yet there is much reason in the argument put forth by a writer in *Farm and Dairy*, that these things are really blessings in disguise. We agree to a great extent with his argument, because we have had practical experience of the results of many floods and droughts in this colony, and in the increased value of farm produce in consequence of these disasters. On one memorable occasion in the sixties, when thousands of acres of crops were from 6 feet to 20 feet under water, ruin appeared imminent, but the flood came after the potato crop was ready to take up. Hence many of the farmers had a goodly store of potatoes safely stored on dry land. These lucky men sold their crop at the rate of £30 per ton, the average price, at that date, of potatoes being from £8 to £10 per ton. There was at the time a very large area (considering the number of farms) under this particular crop, and, had no flood occurred, the price would probably have fallen to £5 or £6 per ton. One acre saved was, therefore, equal to five acres. A farmer with six acres, four of which were not yet dug, realised at 4 tons per acre—the usual crop in new-scrub land, on the coast—£240, whereas had no flood happened the whole six acres would probably have yielded only £142, whilst extra labour in digging, bagging, and marketing 16 tons would have been required. A farmer at Gatton last season realised, we are informed, £400 from ten acres of potatoes. If floods had submerged one half of the farmers' crops all over the Moreton and other districts, that crop being clear of flood might have brought in £600 or £700. The article we refer to reads thus:—"Viewed from a certain standpoint droughts are blessings in disguise, especially to those who are not smitten by them. So also are San José Scale, fruit fly, scab, and all such pests. But the man on the land doesn't generally view them in that light. Had there been no droughts in France, Spain, India, and Russia last year, New South Wales wheat-growers would never have got over 4s. for their wheat. Wipe out droughts and pestilence and disease, and

grain would not be worth the growing, or sheep or cattle the raising. Without dry seasons, Australia in a quarter of a century would produce more wool than the world could consume. And where would prices be then? In five years the world's wheat crops would be such that 2s. per bushel even would be a thing of the past. Maize would not be worth bagging, and would be used as it is to-day in parts of America for fuel. And the man on the land. Where would he be? Without the dreaded scale, sufficient oranges could be grown in the district from Parramatta to Hornsby to supply all Australia. Without Codlin Moth, Tasmania could feed the world with apples. So droughts and diseases have their uses. Only let us hope that the other fellow experiences them, and that we get the big end of the stick."

SMALL MAURITIUS BEAN.

In the October issue of the *Journal* occurs an error in the nomenclature of a bean illustrating Mr. A. H. Benson's article on "Pulses Suitable for Green Manuring." Plate L. (p. 259) is described as *Phaseolus lunatus*, var. *Inamænus*. It should have appeared as "Small Mauritius Bean—*Phaseolus lunatus*." The Horticultural Lima, or Madagascar Bean, belongs to the var. *Inamænus*.

Dairying.

DAIRYING COMPETITION.

THE following results of the milking competitions at the Rosewood and Beenleigh Shows came to hand too late for publication in our last number. The tests at the Rosewood Show were carried out by one of the students of the Queensland Agricultural College, Mr. W. A. McIlwraith:—

ROSEWOOD SHOW, 25TH AUGUST, 1898.

MILKING COMPETITION (HEIFERS).

No. of Heifer.	Pounds Milk.		Test.	Pounds Butter Fat.	Pounds Commercial Butter.		Place Awarded in Competition.
184	16·5	M.	2·7	·445	·498 } ·383 }	·881	W. Berlin, Rosewood.
	9	E.	3·8	·342			
185	9·5	M.	3·7	·351	·393 } ·288 }	·681	W. Berlin, Rosewood.
	6	E.	4·3	·258			
564	16	M.	3·4	·544	·609 } ·486 }	1·008	"Beauty," First. J. Hudson, Rosewood.
	11·5	E.	3·8	·437			
616	16·5	M.	3·1	·511	·572 } ·332 }	·904	"Nellie," Third. D. Elder, Rosewood.
	11	E.	2·7	·297			
801	11·5	M.	4·1	·471	·527 } ·268 }	·795	T. E. Coulson, Lanefield.
	7·5	E.	3·2	·24			
524	15·5	M.	3·3	·511	·572 } ·344 }	·916	"Red Rosebud," Second. J. Elder, Rosewood.
	11	E.	2·8	·308			
595	Withdrawn from competition after morning milking.						

NOTE.—M. denotes morning milking; E. denotes evening milking.

MILKING COMPETITION (COWS).
Government Prize.

No. of Cow.			Pounds Milk.		Test.	Pounds Butter Fat.	Pounds Commercial Butter.	Place Awarded in Competition.	
181	...	...	17	M.	3.3	.561	.628	2.811	First, W. Berlin, Rosewood.
			17	E.	3.8	.645	.722		
			26	M.	3.2	.64	.716		
			15.5	E.	4.3	.666	.721		
182	...	...	11	M.	3.8	.418	.468	1.568	Ditto.
			8	E.	2.7	.216	.241		
			11.5	M.	4.2	.483	.54		
			7.5	E.	3.8	.285	.319		
183	...	...	15.5	M.	2.7	.418	.468	1.924	Ditto.
			11	E.	3.3	.363	.406		
			17	M.	2.8	.476	.533		
			11	E.	4.2	.462	.517		
180	...	...	13	M.	2.2	.286	.32	1.402	Ditto.
			8.5	E.	2.6	.221	.247		
			14	M.	2.7	.378	.423		
			11.5	E.	3.2	.368	.412		
509	...	...	17	M.	2.7	.459	.514	2.102	A. Waters, Lanefield.
			13	E.	4.2	.546	.611		
			16	M.	3.1	.496	.555		
			13	E.	2.9	.377	.422		
617	...	...	21.5	M.	2.3	.494	.553	2.275	"Plum," Third. D. Elder, Rosewood.
			15	E.	3.1	.465	.52		
			19	M.	2.8	.532	.595		
			15.5	E.	3.5	.542	.607		
618	..	...	16	M.	2.1	.336	.376	1.857	Ditto.
			10.5	E.	2.5	.262	.293		
			18	M.	3.7	.666	.745		
			11	E.	3.6	.396	.443		
619	...	...	20	M.	2.9	.58	.649	2.541	"Raatz," Second. D. Elder, Rosewood.
			16.5	E.	3.0	.495	.554		
			16.5	M.	3.1	.511	.572		
			18.5	E.	3.7	.684	.766		
808	...	...	20	M.	1.7	.34	.38	2.11	"Tartar." G. Coulson, Lanefield.
			16.5	E.	2.8	.462	.517		
			18	M.	1.8	.324	.362		
			19.5	E.	3.9	.76	.851		

NOTE.—M. denotes morning milking ; E. denotes evening milking.

BEENLEIGH SHOW, FRIDAY, 30TH SEPTEMBER.
MILKING COMPETITION.
MORNING.

Owner.		Name of Cow.		Pounds of Milk.		Percentage Butter Fat.	Commercial Butter.
Mrs. Cooper		Juliet	...	18	...	4.8	lb. .967
Mr. Marlow		Rita	...	18.3	...	4.4	.924
Mr. Marlow		Dolly	...	17	...	2.8	.533
EVENING.							
Mrs. Cooper		Juliet	...	17.3	...	5.2	1.033
Mr. Marlow		Rita	...	17.4	...	4.8	.954
Mr. Marlow		Dolly	...	17.2	...	3.3	.646

AVERAGE PER DAY.

Juliet.	Rita.	Dolly.
.967	.924	.533
1.033	.954	.646
2.003	1.878	1.179

ENSILAGE FOR DAIRY CATTLE.

MR. MAHON has written stating that the article which appeared in the September number of the *Journal* in reference to feeding experiments with ensilage for milk production at the College is an error, and may tend to mislead those about to conserve fodder for winter feeding. He has always advocated ensilage as a fodder for milch cows—*i.e.*, if made from sound material, not rotten “stuff.”

The poor ensilage referred to was made from green maize and pigeon pea, which Mr. Mahon does not recommend.

The College herd are now being fed on ensilage conserved from green oats and Cape barley, and with good results.

Ensilage was recommended by Mr. Mahon in all pamphlets prepared by him years ago.

Poultry.

A PROFITABLE INDUSTRY—EGG-PRESERVING.

It cannot be expected that eggs will always keep up to the present high prices. Then the question will be asked, “What is our best method of disposing of our eggs to gain the highest price?” and the answer will naturally come, “Keep them until they become dearer.” But to do this, especially in warm or hot weather, some artificial means must be resorted to. Experiments have been carried on for years to gain this end, and with results that they can be kept for a considerable period, and when opened turned out the same as new-laid eggs. There are some methods that are recognised as better than others, and these may be quoted for the benefit of those desirous of knowing. Four ways, totally different in process, are said to produce the best results. These may be termed the wet method, the dry method, the hot method, and the cool method, the main principle being to keep the eggs from contact with the air. As far back as 1791 Letters Patent for preserving eggs were granted to one William Jaynes, the formula being called “Jaynes’ Pickle,” and is still extensively in use as a wet process. But since that time over eighty patents have been taken out in the United Kingdom alone for egg-preserving, but many of them have been mere experiments rather than commercial methods. A very cheap and effective method of the “wet process” is said to be made by taking 5 lb. of fresh slacked lime, 1 lb. of salt, and $\frac{1}{2}$ lb. of cream of tartar; dissolve these in about twenty gallons of water. Take a water-tight vessel, and almost fill with eggs, pour on the pickle until the eggs are thoroughly immersed. The vessel should then be hermetically covered, and placed in a cool room or cellar. Another wet method often resorted to by confectioners and pastry-cooks is by simply dipping the eggs in melted fat, butter, oil, or liquid paraffin, or even water with 5 to 7 per cent. of salt in it, will preserve them for at least three months. But these are perhaps not so reliable as “Jaynes’ Pickle,” which has been tested and stood with good results so long; but in our warmer climate than that from which the recipe comes, its advocates usually make it stronger than the original formula.

The dry methods are still more simple, and consist in packing the eggs lightly in either dry bran, pollard, lime, sand, or other fine and cheap substances. But, above all of these, an authority states that nothing can beat using simply dry salt to pack them in. Take a large box or barrel, place 2 inches of salt at the bottom, then a layer of eggs, end upwards, and a layer of salt to completely cover these, and keep the next layer from touching, and repeat this until the

barrel is full, when 2 inches more salt are needed on top. The lid is then securely fastened and kept in a cool dry place, turning the box from time to time. This method has been known to keep them as fresh as new-laid eggs for a period of nine months. This system is the more satisfactory from the fact that the eggs come out quite clean, and have not the slightest appearance of having undergone any process; while, at the same time, the salt packing can be purchased at a low cost, and can be used for years. The hot method is very simple, but not so extensively resorted to in Australia. The process is to heat water to about 150 degrees F., place the eggs for preserving in a wire strainer, shaped like a basket or bucket, and dip the whole into the water, allowing them to remain immersed for thirty or forty seconds, when the pellicle under the shell coagulates, thus excluding the air from the inner eggs. But the cool method is perhaps the most effective of all, and most simple. The eggs are collected and packed in boxes or baskets, and placed in the freezing or cool chamber, at a temperature slightly above freezing point—say about 32 to 36 degrees. If this temperature is kept evenly throughout, they will keep for any length of time, and in twelve months are as good as “new-laid eggs.” The egg is held in suspension, and no process of decay takes place; consequently, they retain all their original qualities, and such cannot be said of those treated in many other processes. Another cheaper cool method may be tried by placing the eggs in a receptacle in a cool cellar at a temperature below 50 degrees, where they are known to keep fresh for three months at a time. To prove the statement of eggs being new laid after being put into the freezing chamber for a time is that they have been set and hatched after months of keeping.

THE EGG TRADE—A CHANCE FOR POULTRY BREEDERS.

THE market which exists in Great Britain for eggs is shown by the fact that during the first quarter of this year total importations amounted to 2,711,914 great hundreds, of a value of £887,503, which was a decrease of 3·26 per cent. on the first quarter of 1897, an increase of 14·95 per cent. on the same period of 1896, and of 12·50 per cent. on 1895. The chief sources of supply were:—Germany, 795,356 great hundreds, £229,857; Belgium, 742,508, £232,710; France, 540,799, £217,055; Denmark, 342,820, £121,866; Russia, 15,966, £4,902; Canada, 8,670, £3,137. It will be of interest to Australian poultry farmers, who would have to preserve the eggs in some manner before they could be shipped, to know that a series of experiments in the preservation of eggs was carried on last year in Germany. After eight months of preservation, 400 eggs, divided into twenty different parcels for that many methods of experiment, were examined, with heterogenous results. The most successful methods, with the percentage of loss, were:—Varnished with sward, 20 per cent. bad; preserved in wood ashes, 20 per cent. bad; treated with boric acid and water glass, 20 per cent. bad; treated with manganate of potash, 20 per cent. bad; varnished with vaseline, all good; preserved in lime water, all good; preserved in a solution of water glass, all good. The last three methods are considered the best ones, and especially the preservation in the solution of water glass, as varnishing the eggs in vaseline takes too much time, and the treatment with lime water sometimes communicates to the eggs a disagreeable odour and taste. There is one drawback with eggs preserved in a solution of water glass—the shell easily bursts when placed in boiling water. It is said this may be avoided by cautiously piercing the shell with a strong needle.

There are in the United States about 2,000 establishments devoted exclusively to the sale and distribution of food products wholesale. There are many others that combine wholesale and retail trade. These establishments employ from 12,000 to 20,000 bright, active, intelligent, and energetic

travelling salesmen, who through the entire year repeatedly visit each city, village, and cross road where people dwell and sales can be made, urging the use and consumption of their goods and wares. These emissaries of the wholesale trade reach more people, do more talking, extend and enhance more the interests of the trade in any accepted line than all other means combined. They are backed by unlimited capital, and are ever ready to take up any line of productive industry wherein profit, however small, is reasonably sure.

FOOD FLAVOURING EGGS.

THE conditions under which fowls are kept, and the food on which they are fed, do influence the flavour of the eggs, but not to the extent that one would think. For instance, fowls kept in confinement and without a grass run do not lay eggs with a yolk so rich-coloured as those with a wide range of grass. The richer yellow the yolk, the finer the flavour. But if the fowls in confinement are well supplied with green, and kept in perfect health, the difference in the eggs is very slight. Fowls can eat a great deal of offal and high-smelling food without their eggs gaining any objectionable flavour. I have fed laying fowls daily with pressed meat which, when dissolved in boiling water to mix with the meal, gave off a very evil smell; also on liverine, which is a mixture of fish and meal, and this also, when the boiling water is poured upon it, raises an odour bad to beat. But the eggs had no objectionable taste. A diet of putrid fish and meat will flavour the eggs if the fowls eat enough of it. It should be remembered that fowls are gross feeders, and there is little they will not peck at, so if there is carrion or rotten fish about they are likely to eat it, and possibly to the extent of flavouring their eggs.—*Farmer and Stockbreeder.*

CONDITION OF TABLE POULTRY.

It is not enough to kill a bird when it is plump and in good condition if intended for market. Half the battle lies in plucking and dressing, in its making a good appearance in the poulterer's shop. This is a point often lost sight of. A fowl should never be killed when the new feathers are just appearing; the stumps are terribly hard to get out, and spoil the appearance. Yet such birds are often seen in shops; they have been plucked, but the new feathers are showing through the skin, and will severely try the patience of the cook. These birds are generally young fowls kept just too long and killed on the commencement of their moult instead of two or three weeks earlier. The farmers' wives round Yarmouth want no instruction on this point; their fowls at Yarmouth market always look tempting on the stalls. One ingenious method they have of setting off the fowl's appearance is to stuff it with a towel, thus giving it a plump appearance. But whatever "the tricks of the trade," the poultry are good in quality, well picked, and well dressed.—*Farmer and Stockbreeder.*

COOKING OLD FOWLS.

THERE is often some difficulty in disposing of the surplus stock, by which I mean the birds which, having finished their second laying season, it is not advisable to keep longer. In this case they should be killed and eaten. If

required for home consumption only, a quick method of plucking is to plunge the dead fowl into boiling water. Then the feathers peel off at a touch, and the flights are far more easy to remove. But with regard to cooking! The proverb about old hens being tough is perfectly true, but the toughest fowl can be made tender and palatable if only boiled, or rather simmered, long enough. You can't boil an old fowl tender; it should be placed in a saucepan just covered with water and set on the fire till just on the boil, then the saucepan should be moved and allowed to simmer only. A bird under three years old can be thus boiled and then roasted; over that age it is best to be content with boiled fowl. But boiled fowl—old fowl boiled—makes an excellent dish, and, if properly cooked, the flavour is retained and bird equal to a pullet. To sell a bird scaling over 5 lb. for about 1s. 6d., which is about the price given, is absurd, as it is worth far more than that for home consumption. Surplus cocks can be treated in the same way, now that the breeding pens are broken up. All not wanted for next season should be killed, if it has not been already done.—*Farmer and Stockbreeder.*

The Orchard.

DISEASE IN PINEAPPLE PLANTS.

CARL F. GERLER, Hendra.

WHAT astonishes me most in this matter of the pineapple disease is that no one seems to have any idea as to its cause. My own opinion, based on many years' experience, is that the root of the thing lies in the want of good farming. There is too much of this slipshod farming carried on (especially around Brisbane) in Queensland. It is all very well to tickle the surface of new ground, and then plant, and in most cases the return will be found satisfactory; but as the same land has to be worked year by year, something more than merely tickling will be required in order to get a fair return. All will agree with me that this disease amongst the pines makes the greatest havoc during the winter months, and that the strongest looking plants are more often the first attacked, which can, I think, be accounted for in this way: Having been planted in a dry season, and the site being on the side of a ridge, there are wet spots here and there. While the dry weather lasts the plants grow vigorously; but let a cold or wet winter come, and you will at once see them begin to turn yellow, and in a few days you can lift the whole centre of the plant out, the smell being very offensive, and the plant eventually dying in the ground if left there. I therefore give as one reason: The want of deep working and proper draining. How is one to know when and how to drain? Certainly not by just looking at or tickling the surface; but by working the ground deep, you can at once see what draining is required. Many growers suppose that because the pineapple is a surface-growing plant it does not require much draining. That is a mistake, for the pine likes a warm dry soil, and where is a wet spot the ground is also colder. Another reason for the appearance of this disease is the want of using the sawdust manure with discretion and forethought.

I will guarantee to kill a row of the strongest pines growing in or around Brisbane in less than six months by means of plenty of sawdust manure mixed with a little coal-ashes (this being the sole cause of disease), though it may not have been heard of in that district before. The first appearance of the

disease was when the trams started in Brisbane; the yards and stables were filled with coal-ash, then the stalls were bedded with plenty of fresh sawdust; thus a lot of the coal-ash got mixed with the sawdust and manure, and was carted away, and unwisely used by the planters for pineapples. There are others, again, who fancy that pines cannot get too much manure; this is a mistake, and is the last cause of the appearance of the disease in the pineapple plant. (It cannot affect the fruit when formed on the plant itself.)

About twenty-five years ago, when walking through a plantation of pines, I noticed what is known to growers as blanks (being a small opening or vacant spot here and there among the rows of old pines), and that these blanks were filled up with at least $1\frac{1}{2}$ to 2 feet deep with fresh horse manure. I turned to my friend and said, "This cannot be good for the pines," and I also said that he would live to see that I was right. He asked for an explanation, which I gave in this way: Making a hole in the middle of one of these blanks, I requested him to put his hand down into it, and feel the great heat for himself, and to notice the smoke rising from it. Then I went to another blank, put my hand down, and took a handful of the manure up very steadily, asking him to observe the long threads (like cobwebs) hanging to it, so much so that one would have thought that the manure had been mixed with cobwebs.* My explanation was that such heaps of fresh manure, put almost directly on the pine-roots, must eventually rot or parboil all the roots on the surface, when the manure became wet and then got the hot sun blazing upon it; and as nearly all the roots are on the surface, it must produce a weakness to the plant, and end in its destruction altogether. I believe that I am right in saying that the disease was first seen on that plantation; and that on many of those plantations where the disease has been noticed, the plants came directly or indirectly from it. While quite agreeing with centre manuring, and plenty of it too, I think that there ought to be at least 4 to 6 inches between the manure and the pine-roots, which can easily be done by putting all the trimmings of the leaves around the hole and all over the vacant spot, or by placing a layer of grass on it before putting in the manure, so that when rain does come all the substance will soak into the roots, and at the same time keep the roots much cooler.

Now that we have the disease in pines, the question arises: How, are we to get rid of it, or put a check to its ravages? My opinion is that we *can* get rid of it, not by slipshod farming, but by actual hard work, both with hands and head. Had the growers years ago used a little more brain with their growing of the pines, there would not be any trouble with this disease now.

The best thing that we growers can do is to do our own work and with a *united* effort, and not trouble the Government until we have tried our skill first; and if we fail, then it will be time enough to ask them to help us. Let the growers form themselves into an association and see what can be done towards eradicating the disease, and, if needs be, appoint an officer for the purpose of inspecting plants and ground about to be planted with pines, and giving such instruction as may be necessary.

But, above all, I would say: See that all ground is well prepared before planting; this, combined with a mixture that I would suggest in the treatment of older pines, would help to destroy the disease, if not free us altogether from it. The mixture consists of 2 parts of good manure, 1 part of ground, and 3 parts of elbow-grease to be applied with a liberal supply of *brain* sauce. Years ago we could grow far heavier pines—that is, the common or rough leaf—that any you see about now. I have grown them myself up to $6\frac{1}{4}$ lb. in weight. [The Department has already experts in its service who are always prepared to advise as to suitable soils, disinfection of plants, and inspection.—Ed. *Q.A.J.*]

* Mushroom spawn, probably.—Ed. *Q.A.J.*

Botany.

CONTRIBUTIONS TO THE FLORA OF QUEENSLAND.

By F. MANSON BAILEY, F.L.S.,
Colonial Botanist.

Order MELIACEÆ.

FLINDERSIA, R. Br.

F. Leichhardtii, *C. DC.* Mono. Phanero. I. 731. Branchlets densely puberulent, greyish yellow, elenticellose. Leaves opposite, rather long petioles, impari-pinnate, 2-jugate; leaflets opposite, shortly petiolulate, sub-oblique oblong-elliptical, equal sided and acute at the base, the apex acuminate, glabrous on both sides, membranous, subpellucid, pellucid-punctate, about 4 in. long, about 1 in. broad, veins thin. Panicles axillary, about as long as the leaves, thinly puberulent, peduncle about 1 in. long. Flowers shortly pedicellate. Calyx of 5 round-ovate, ciliate sepals. Petals 5, glabrous, about 2 lines, membranous, elliptical, obtuse. Staminodia 5, filaments bearded at the top. Anthers scarcely $\frac{1}{2}$ -line long, reniform; apex obtuse. Disk membranous, entire, connate at the base with the filaments. Ovary subglobose, 5-celled, hirsute. Ovules in each cell 4, in 2 series. Style glabrous, shorter than the ovary. (From *C. DC.* Mono. Phan. I. 731.)

Hab.: Moreton Bay (Leichhardt in Herb. Mus. Par.) *C. DC.*, *l.c.* I have no knowledge of this tree, neither can I find it recorded in Baron Mueller's writings.

F. pubescens, *Bail.* A large umbrageous tree; branches, especially those bearing leaves, closely covered with a velvety tomentum, stout, and strongly marked by the scars from the fallen leaves. Leaves opposite, impari-pinnate, or pari-pinnate from the abortion of terminal pinna, on stout petioles of about 5 in. semiterete. Rhachis from 10 to 15 in. long, and with the petioles clothed with a similar tomentum as the young branches. Leaflets 6 or 7 pairs and a terminal one, 5 to 9 in. long, $1\frac{1}{2}$ to 3 in. broad, more or less rugose, lateral parallel nerves, 18 or 20 on either side of the midrib, glabrous, punctate and glossy above, more or less hairy on the underside, oblong-lanceolate or some oblong; the lateral ones auriculate at the base, the terminal one cuneate at the base and on a petiolule of 1 in., the lateral petiolules very short, the leaflets nearly sessile; pellucid dots minute, only visible with the aid of a lens. Panicles terminal, widespread, and dense. Flowers pedicellate, numerous, white, and very fragrant. Calyx-lobes rotund, about $\frac{1}{2}$ -line diameter, the margin laciniate-ciliate. Petals white, oblong-linear, about 2 lines long, 1 line broad, woolly-hairy on the face in the lower half. Filaments incurved, hairy at the top. Anthers greenish, ovate-apiculate. Disk orange, connate to the base of the filaments, undulately lobed. Stigma sessile, minute. Ovary hairy. Fruit echinate outside, about $5\frac{1}{2}$ in. long, dividing into 5 boat-shaped valves. Seeds about $2\frac{1}{2}$ in. long, winged at both ends. This may be the tree alluded to in *Fragm.* v. 143 as *F. Schottiana*, var. *pubescens*, but even so it should, in my opinion, rank as a species.

Hab.: The above description refers to trees now (October) flowering on Wickham Terrace and other town reserves. The seed from which they were raised was obtained by Mr. Walter Hill, the late Colonial Botanist, from tropical Queensland. As a shade tree it would be difficult to find its superior. The first tree planted has borne fruit for the past few years, and Mr. Robt. McDowall, who has charge of the reserves, has carefully collected the seed, and raised plants which have been used for planting and distribution.

F. collina, *Bail.* A small tree, the bark falling off in rather larger patches than in allied species, but leaving the same pale-coloured patches upon the stem; branchlets corrugated, and when young more or less covered with short ferruginous hairs. Leaves opposite, impari-pinnate, petioles about 1 in. long, flattened, the edges thin but scarcely winged. Leaflets 3 to 5, obovate-cuneate, sessile, the terminal one sometimes 3 in. long and $\frac{3}{4}$ -in. broad, the lateral ones smaller, equilateral; apex obtuse, truncate, often emarginate, parallel lateral nerves erecto-patent, numerous, often very prominent on the upper side which is very glossy, underside thinly hoary or pale-coloured. Rhachis slightly winged. Panicles terminal, about $2\frac{1}{2}$ in. long and nearly as broad, densely branched, usually on very short peduncles, more or less covered with a close stellate pubescence. Flower-buds globose, slightly 5-angled. Calyx small. Petals imbricate, ovate-oblong, thick in the centre, hairy on both sides. Filaments shorter than the petals, glabrous, rather thick and angular. Anthers ovate-cordate. Fruit echinate, oblong, $1\frac{1}{2}$ to 2 in. long, dividing into 5 separate valves.

Hab. : Ranges southern parts of the colony. Wood hard, close-grained, yellow, strong, and durable. Bailey's Cat. Ql. Woods, No. 73c given as *F. Strzeleckiana*, var. *latifolia*.

Order NEPENTHACEÆ.

(Pitcher-plant Family.)

By additional specimens of these plants received from Mr. Frank L. Jardine, I am enabled to complete the description of *N. Kennedyi*, and also give descriptions of three more Queensland species.

NEPENTHES, Linn.

N. Kennedyi, *F. v. M. Fragm. v. 154.* Inflorescence (male):—Peduncle tomentose, about 3 in. long, raceme 6 or 7 in. long, flowers dense. Pedicels about 5 lines long; perianth-segments $2\frac{1}{2}$ lines long and 2 lines broad. Staminal column $1\frac{1}{2}$ line high, bearing a head of anthers about $\frac{1}{2}$ -line in diameter.

The above specimens were received from Mr. F. L. Jardine as *N. Kennedyi*, and I have no reason to doubt them belonging to that species, although no pitchers accompanied the flowers-racemes.

Table showing a few of the differential characters of the Australian species.

Stems long climbing—

Pitchers inflated below the middle, 3 to 6 in. long,
green; anterior ribs without any crest; stalk
with a curl in the centre ... 1. *N. Kennedyi*.

Stems shortly climbing—

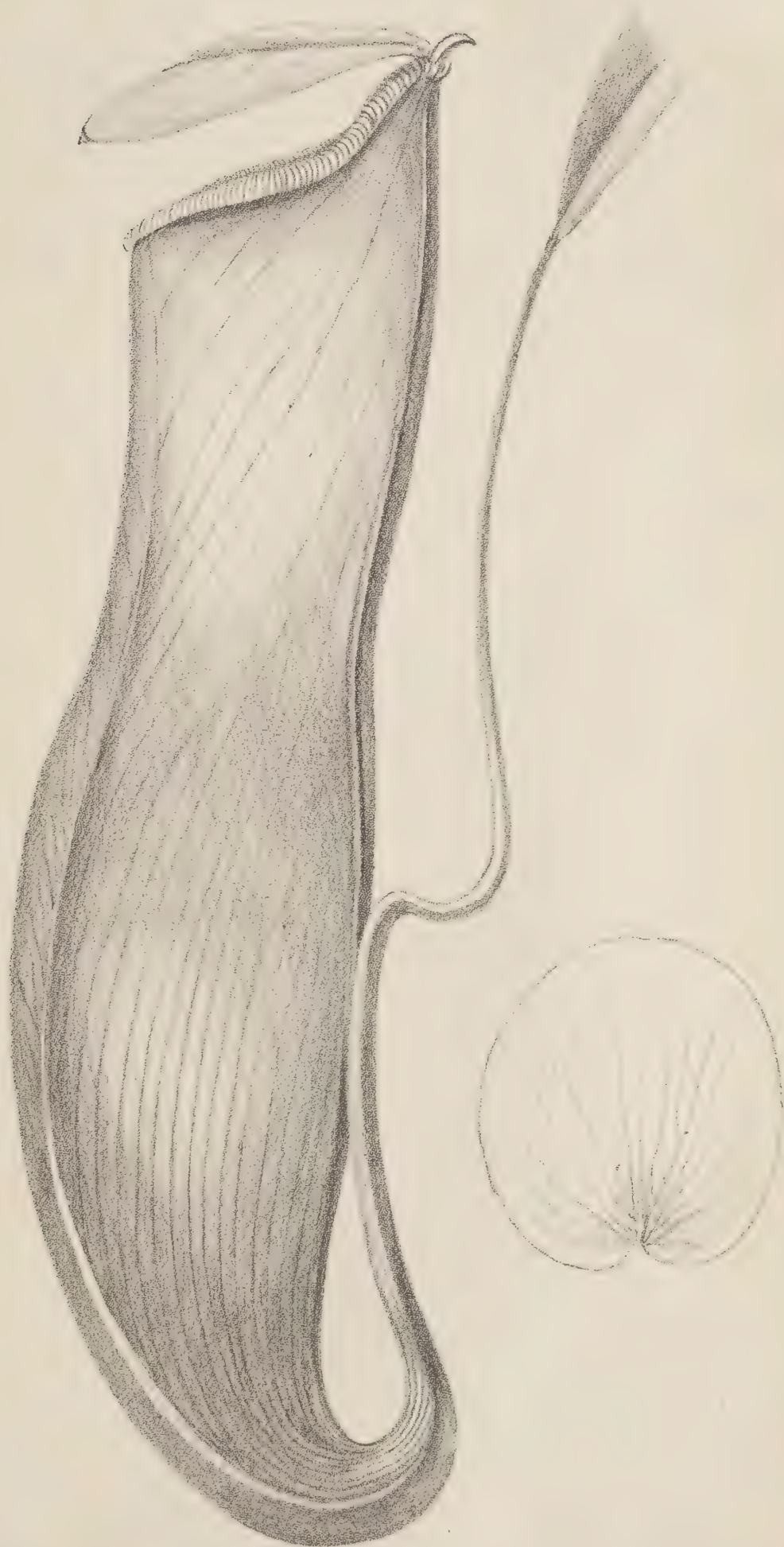
Pitchers inflated near the base, 3 to 6 in. long, pink-
ish; anterior ribs winged, the wings 1 or 2 lines
broad, and more or less prominently ciliate-
toothed, without any curl in the centre of the
stalk ... 2. *N. Bernaysii*.

Stems elongated scarcely climbing—

Pitchers narrow at the base, then cylindrical to the
top, 6 or 7 in. long, green with white streaks;
anterior ribs prominent at the base but not
winged; stalk flexuose without a curl ... 3. *N. albo-lineata*.

Stems not climbing rather slender—

Pitchers slightly enlarged at the base, 3 to $4\frac{1}{2}$ in.
long, judging from the dried specimen more or
less reddish when fresh; anterior ribs prominent
but not winged; stalk slender not forming a curl 4. *N. Moorei*,



F. Wills Del

Nepenthes albo-lineata

F. Elliott Lith



F. Wills Del.

Nepenthes Moorei

F. Elliott Lith.

Stems not climbing rather stout—

Pitchers inflated below the middle, 5 to 7 in. long, more or less purple stained; anterior ribs with narrow purple wings; stalk straight ... 5. *N. Jardinei*.

Pitchers enlarging from the base to a diameter of about 3 in. at the top, length about 6 in., marked with reddish-purple colour; anterior ribs hard, scarcely winged; stalk straight, somewhat flattened ... 6. *N. Rowanæ*.

Stems not climbing very short—

Pitchers numerous, slightly inflated above the base and enlarging again at the top, $1\frac{1}{2}$ to $2\frac{1}{2}$ in. long; anterior ribs with entire wings about $\frac{3}{4}$ -line broad; stalk slender, no curl ... 7. *N. Alicæ*.

N. albo-lineata (n. sp.) Plate LVIII. Plant very slightly tomentose. Leaves shortly clasping the stem; the broad portion or blade 6 to 7 in. long and 2 in. broad, tapering to the base, or a winged petiole of 2 in., and the upper portion to where the costa becomes naked forming the stalk of pitcher. This stalk is flexuous, but without a curl at the centre, about 6 in. long. Pitchers (green, slightly streaked with white—*F. L. Jardine*) 6 or 7 in. long, enlarging from a narrow base to a diameter of about $1\frac{1}{4}$ in., and keeping about this diameter to the top; anterior ribs not winged, but sharply prominent for about one-third of their length from the base, the longitudinal nerves and reticulate veins not prominent. Peristome narrow, posterior spur rather broad, tomentose, much recurved. Operculum elliptical, glossy with the numerous glands of the genus. Male inflorescence terminal or nearly so. Peduncle 5 in. long, hoary; raceme about 8 in. long. Flowers numerous. Pedicels about 4 lines long, segments of perianth $2\frac{1}{2}$ lines long, linear; column $2\frac{1}{2}$ lines high, bearing a head of anthers $\frac{3}{4}$ -line in diameter. Female flowers unknown.

Hab: Cape York Peninsula, *F. L. Jardine*. The white streaks mentioned by Mr. Jardine are not observable on the dried pitchers.

N. Moorei (n. sp.) Plate LIX. (After C. Moore, F.L.S., for many years Director of Sydney Botanic Garden, and one of the first to record this genus as occurring in Australia.) Stems attaining a few feet, but not climbing. Leaves nearly glabrous, the expanded portion scarcely exceeding 1 in. wide at the broadest part, from which tapering to the base without forming a petiole portion, and tapering upwards to where the costa becomes naked, texture thin, longitudinal nerves 4 or 5 on each side of costa, but not prominent, the naked portion of costa or stalk of pitcher usually slender and without a curl between the acuminate top of the lamina and the base of the pitcher. Pitchers 3 to $4\frac{1}{2}$ in. long, 1 to $1\frac{1}{4}$ in. broad, glabrous or slightly hoary, slightly enlarged above the base; anterior ribs prominent but not formed into wings; longitudinal nerves numerous and more or less prominent as well as the reticulate veins. Peristome narrow, posterior spur somewhat erect but curved back, resinous. Operculum elliptical, under $1\frac{1}{2}$ in. diameter, resinous. Inflorescence (male) usually from the axils of the upper leaves. Peduncles 4 to 6 in. long, racemes 6 to 8 in. long, rhachis and back of segments hairy, flowers numerous, but not particularly dense. Pedicel slender, 4 lines long, segments of perianth reflexed upon the pedicel, about 2 lines long and 1 line broad, free to near the base. Staminal column about 2 lines long, bearing a head of anthers about $\frac{1}{2}$ -line in diameter. So far as the specimens to hand show, the female plants seem to be of smaller growth. Racemes 3 to 4 in. long. Perianth segments narrower than in the males. Ovary hoary-tomentose. Capsule 8 lines long.

Hab.: Cape York Peninsula, *F. L. Jardine*. Judging from the dried specimens, the pitchers are probably, when fresh, more or less stained with red.

N. Alicæ (n. sp.) Plate LX. (After Miss Alice Jardine, an enthusiastic collector of Cape York Peninsula plants). A dwarf plant, forming pitchers when only 3 or 4 in. high, not exceeding a height of more than a foot (*F. L. Jardine*), starting from a creeping rhizome. Leaves numerous, sessile, and stem-clasping at the base, lamina or broad portion lanceolate, falcate, conduplicate, 2 to $3\frac{1}{2}$ in. long, $\frac{1}{2}$ to $\frac{3}{4}$ in. broad when opened out; parallel nerves 3 or 4 on each side of costa, the naked portion or pitcher stalk slender, about 2 to 3 in. long. Pitchers $1\frac{1}{2}$ to $2\frac{1}{4}$ in. long, $\frac{1}{2}$ to $\frac{3}{4}$ in. diameter, slightly enlarging above the base, and again at the orifice, anterior ribs with entire wings about $\frac{3}{4}$ -line broad, parallel longitudinal nerves numerous; and as well as the reticulations rather prominent; peristome narrow, posterior spur recurved, often flattened and rather long. Operculum orbicular, 8 lines diameter, purple and glandular. Flowers and fruits unknown.

Hab. : Cape York Peninsula, *F. L. Jardine*. Some effort should be made to introduce this unique species into cultivation.

Order CYCADACEÆ.

MACROZAMIA, Miq.

M. platyrhachis (n. sp.) Seems not to form stems above the ground; the underground stem oval, resembling a somewhat large Swede turnip, about 1 ft. long with a circumference of 2 ft. near the centre, smoothly imbricated by the thin bases of former leaves. Leaves probably about 12 in the crown, glabrous or when young very thinly pulverulent, falcate, about 3 ft. long of which the petiole occupies about 6 or 8 in.; no woolly substance at their base. Petiole and rhachis flat on the upper, convexed on the underside, the broadest part about 6 lines. Pinnae or segments attached along the thin edge of the rhachis, and slightly decurrent without any callosity, about 23 on each side of rhachis, the lowest ones often the longer, measuring about 15 in. long and $\frac{3}{4}$ -in. wide, very coriaceous, curved, erect; longitudinal nerves numerous and prominent; apex obtusely acuminate. Scapes 3 on the only plant (male) to hand, 6 to 9 in. high, bearing cylindrical cones 3 or 4 in. long, scales of the upper portion bearing fine erect central spines. According to Mr. Brock-Hollinshead, the female cones seldom exceed a foot in length, and closely resemble those of *M. Miquelii*, F. v. M. Two dry nuts received with the plant are oblong, bluntly angular, and about 13 lines long.

Hab. : Planet Downs, *H. C. Brock-Hollinshead*, who informs me that this species does not cause rickets in stock.

PLANTS REPUTED POISONOUS TO STOCK.

By F. MANSON BAILEY, F.L.S.,
Colonial Botanist.

NOOGOORA BURR (*XANTHIUM STRUMARIUM*, Linn.).

AN annual belonging to the order Compositæ, often attaining a height of 8 to 10 feet, with wide spreading branches. The stems, especially in a young state, are mottled with purple. The leaves, which are from 2 to 6 inches broad, much resemble those of a mallow. The male and female flowers are separate, but on the same plant, the upper ones being the male and the lower ones the female. The burrs are much larger, and the hooked prickles with which they are clothed are coarser, than those of the Bathurst burr (*Xanthium spinosum*). See Plate LXI. The plant, which is known also as the "Small Burdock" and "Cockle Burr," was introduced into the colony about nineteen years ago, at Noogoora Estate, near Ipswich. At that time Mr. P. R. Gordon, Chief Inspector of Stock, forwarded specimens to me which had been received from the above locality. In identifying the plant I remarked that if not eradicated it would become a great pest, and he published this warning, but as no notice was taken of this we now find the Southern part of our colony overrun with the pest. Year after



J. Wils. Del.

E. F. H. H.

Nepenthes Alicæ

Plate LXI.



NOOGOORA BURR (*Xanthium strumarium*).

year I have received specimens of it, for identification, with the report that it was suspected of poisoning stock. Only the other day I was instructed to visit Nerang, where stock had died, as was supposed, from browsing upon poison plants. At the spot where the stock had died there was a dense growth of Noogoora Burr, and it was said that there was a similar young growth of this plant when the deaths occurred (September). At the time of my visit (5th October) young stock were feeding upon plants of this species, but these were, for the most part, very weedy and not at all succulent on account of there being such a dense growth of them. I consider that this plant would only be really dangerous when making a rank, succulent growth. Mr. W. C. Quinnell, Government Veterinary Inspector, who accompanied me to Nerang, furnished a report for the Chief Inspector of Stock, and by kind permission I am enabled to attach hereto an extract from same.

Experiments made by the late Dr. Joseph Bancroft, soon after the plant made its appearance in the colony, proved conclusively its poisonous nature. Its effect on cattle was to paralyse the heart, induce torpor, and cause death without pain or struggle. He also advised most exact measures being taken to avoid adding this poisonous weed to the flora of Australia.

Various medicinal properties have been ascribed to this plant by writers, but none of sufficient importance to in any way compensate for its noxious character as a weed.

The only way to keep this plant in check is to destroy the young plants as they spring, so as to prevent the production of seed.

EXTRACT FROM REPORT BY W. C. QUINNELL, M.R.C.V.S., LONDON, TO THE CHIEF INSPECTOR OF STOCK, *re* POISONING OF STOCK AT NERANG.

Arriving at Nerang, Mr. Bailey and I were met by Mr. Clare, the acting clerk of petty sessions, who took us to the locality where the animals had been pastured, and where we soon discovered the weed which had caused the injurious effect, for on examination of the pasturage it was seen that the Noogoora Burr was generally abundant, and it had been eaten down over certain areas.

I regret not having had the opportunity of seeing an animal attacked with the reported malady, or making a *post-mortem* examination, as deaths in the township had ceased two or three weeks previously. However, we received from the owners, and those that interviewed us, a very clear description of the symptoms and *post-mortem*—the latter made by Mr. Clare—and I have no hesitation in stating that the mortality was due to the cattle feeding too freely upon the succulent *Spring* Noogoora Burr, producing the disorder known as Tympanitis, or Hoven—viz., a distension of the rumen, or paunch, with gas derived from fermentation of the ingesta, and ultimately death by asphyxia, induced by pressure of the stomach on the lungs by the medium of the diaphragm, or from absorption of noxious gases into the blood.

SYMPTOMS.—Tympanitis (variously known as “Hoven,” “Blown,” or “Fog-sickness”) is easily recognised by the swelling on the left side, which may make its appearance while the animal is feeding, or shortly after. The symptoms are rapid, as a rule, in their appearance: rumination is suspended, dribbling of saliva from the mouth, and the nostrils dilated. As the accumulation of gas increases the greater is the distress of the animal, owing to the increasing obstruction to the entrance of air into the lungs; and this is characterised by moans and grunts, bloodshot and staring eyes, staggering gait, and, insensibility at length supervening, the animal falls prostrate to the ground.

PREVENTION AND TREATMENT.—Animals should be immediately removed from affected areas, and the localities thoroughly cleared of the noxious plant.

In Early Stages of the Disorder.—Diffusible stimulants administered promptly are efficacious in dispelling accumulated gases—viz., a full dose of ammonia, ether, alcohol, or chloroform in solution. Exercise and friction to abdomen hastens expulsion of gas. Introduction of hollow probang allows escape of gas when the amount of food in the stomach is limited.

In Extreme Cases.—When distension and distress are present, puncture abdominal wall (the most prominent part of swelling is generally a sufficient guide for the operator) with trocar and canula; or, where these are not at hand, a butcher's, carving, or other large knife would serve the purpose.

After abatement of acute symptoms, administer a strong purgative to remove any irritant, and feed for several days on soft, easily digestible food.

Viticulture.

ARTIFICIAL COOLING FOR WINE-MAKING.

THE Viticultural Department of the College of Agriculture at the University of California has completed a series of successful experiments with an apparatus that is expected to revolutionise wine-making. The apparatus is a wine cooler or refrigerator, and by its use "stuck tanks" will be a thing of the past. As wine-growers lose thousands of dollars yearly from "stuck tanks," the importance of the discovery can easily be realised. The experiments—which have been causing sleepless nights to the viticultural staff—were under the charge of Professor A. P. Hayne, head of the department, who is the inventor of the new process. It is the result of his studies of wine-making in Africa and the French colonies of Algiers and Oran, where the temperature is high. While admitting that many improvements are yet to be made, Professor Hayne claims that his refrigerator will put an end to "stuck tanks," and make fermentation possible in temperatures unfavourable to it. In most of the large wineries of the State the "stuck tank" is the *bête noire* of the wine-maker. It causes not only the loss of valuable wine, but also renders it unsound, and reduces it in quality. In cold regions the "stuck tank" is unknown. The "stuck tank" is a fermenting vat that suddenly stops all activity before the work is completed. When fermentation sets in, and the temperature is not favourable to the proper functioning of yeast cells, the activity at once ceases, or becomes so slow that organisms unfavourable to the wine start up. When all the sugar in the juice of the grape is thus not split up in equal parts of alcohol and carbonic acid at first, the wine is apt to become an easy prey to the wine disease germs, that may subsequently cause the total loss of the wine. The question of temperature during this first fermentation has been one of the questions for makers of refractory wine for years, and Professor Hayne now believes the problem solved.

The apparatus now at the University is simplicity itself. According to *Ice and Cold Storage*, it consists of thin-tinned copper tubes, flattened so as to allow the maximum surface consistent with a working volume of output of wine. The old spiral is discarded to render rapid cleaning of the tubes possible, and makes the apparatus consist of even tubes of well-tinned copper, 4 inches x $1\frac{1}{2}$ inch cross-section diameter, and 4 feet long. These are placed one above the other, with a 2-inch space between. At each extremity clamps fastened with thumbscrews enable the apparatus to be cleaned with an iron rod at will. The surface exposed to the cooling agent is 42 feet. The height of the whole apparatus, when placed upright, is 5 feet; width, $4\frac{1}{2}$ inches; and the length, 4 feet. The total weight is 120 lb. The cost of the machine was 75 dollars. The idea is to watch the temperature of the fermenting tank by plunging a thermometer into it, and pumping the partly-fermented wine from the bottom of the tank to the top should the temperature approach an unfavourable height. There is no extra work by the use of the apparatus, and Professor Hayne declares the method of cooling to be as simple as the mechanism. One method is to plunge the apparatus into a box just large enough to hold it, and pass a stream of cool water into the box at the bottom. Another is to have a jet of water, in the form of fine spray, fall on the surface of the tubes, and at the same time fan them with a current of air. Professor Hayne considers the second method the more practicable, as it does not depend upon the temperature of the water, which cannot always be had below 75 degrees Fahrenheit. When the experiments were made at the University both methods were found to work admirably, and wine several degrees above a favourable temperature was quickly reduced by the cooler.—*Engineer*.

Apiculture.

QUEENSLAND HONEY.

Writing in August last to the Under Secretary for Agriculture respecting the testing of the London honey market, Mr. Alfred Wright says, *inter alia*, that the highest market value at present for Queensland honey in London is 22s. per cwt., but that a higher price would probably be obtained in November. He considers that honey should only be shipped from Queensland to arrive in London from September to December. At other periods the market is generally reported as sick, as plenty arrives from all parts, and there is no firm demand. The holding to await a demand should be in Queensland and not in London, as prompt sales on arrival pay best all round.

Being anxious that the opportunity afforded him of opening up some business should take a practical form, and that to the advantage of those concerned, Mr. Wright made arrangements with a well-known Mincing Lane colonial broker, with whom he had been associated before going to the colonies, and who has the highest reputation, to receive any consignment made to him, and to allow the consignor to draw against a bill of lading upon him for £22 per ton c.i.f. paid on this side. This is rather out of the usual custom of brokers, but was agreed to in order to start the business. Thus the consignor will have the advantage of placing his honey at the very lowest cost. Mr. Wright strongly advises any producer to take advantage of the opportunity.

The firm in question is Messrs. W. and S. Bowditch, 43 Mincing Lane, London.

With respect to shipping oranges to London, the same gentleman states that the system of circulation of air in a steamer's hold is the right and only right one, both for apples and oranges—particularly oranges.

Refrigeration induces moisture, and the least moisture on oranges causes a mould, after which decay sets in. Fresh air, and a constant circulation of it, means a dry hold, so that the oranges would be free from the danger of moisture falling on them. The difficulty was, and yet is, to find the correct means of applying it so as to obtain a constant circulation. It is singular that ventilating engineers of the highest reputation are unable to suggest any means to this end. One principle is, however, unanimously agreed to, and that is, the necessity of forcing in the air, instead of exhausting. Until the last year or two exhaustion was the universally accepted medium to induce circulation—"Exhaust and the air will find its way in," was formerly said by every authority. Now it is—"Force in the air and it will find its way out."

Mr. Wright concludes by promising, on his return to the colonies, to forward the fullest details of all the information he has been able to gather on the subject that may be of value to the orange-growers and honey-producers.

Tropical Industries.

DETERMINING THE DENSITY OF SUGAR-CANE.

By A. ALEXANDER RAMSAY.
Sugar Chemist, Experiment Farm, Mackay.

THE question of determining the "density" or, better still, "the sugar content" of sugar-canes by some easy and rapid method is an interesting one, especially to sugar-growers.

The value of cane to the manufacturer depends entirely on the percentage of sugar. To determine this is not an easy matter, and few farmers are likely to possess themselves of the apparatus necessary to carry out these tests.

The "density" or—to be more accurate—the "total soluble solids" in the cane-juice can, however, be easily ascertained, and this in a simple manner calculated to the cane. This density is usually spoken of as so many per cents. Brix.

Before proceeding to say how this may be done, perhaps it will not be out of place to say a few words on the composition of the sugar-cane. The soluble solids consist of—1, Cane-sugar; 2, sugars which reduce copper sulphate solution, generally called "fruit sugar"; 3, organic matters, not sugars (being organic acids, &c.); 4, a small portion of mineral matter or ash.

The whole stalk of cane is not homogeneous. The portions nearer the root-end of the cane contain more soluble solid matter and cane-sugar, and have a higher quotient, than portions more remote.*

Now, as the quotient of purity decreases the further we get from the bottom of the cane, the factor which, multiplied by the Brix, would give us the per cent. cane-sugar is always different for different portions of the cane.

Again, the "soluble solid matter" is a varying quantity from the bottom of the cane upwards, so that it would be a very difficult matter to choose that section of cane which will have the same composition as the average of all sections—*i.e.*, of the whole cane.

With this explanation of the nature of the cane and of the difficulties in the way of ascertaining the density, I will proceed to the practical determination.

Under any circumstances, it is almost useless to take portions of a growing cane to test, with the intention to leave the balance of that cane to grow. It is best to select a few stalks which, on appearance, represent the average of the crop of cane we wish to test. The greater the number of stalks we select to form one sample, the nearer ought we to arrive at the average of the block; but from three to eight stalks will be generally sufficient for this test.

Having selected our canes, we proceed to split them longitudinally in halves. These halves are again split into quarters, and *one* quarter from each cane put to one side.

We have now only to extract the juice from these quarter sections. This may be easily done by a small vice having a funnel or gutter arrangement underneath, delivering into a bottle or small glass cylinder.

Having squeezed all the quarters, the juice in the bottle is mixed, and the density ascertained by a saccharometer, or Brix Spindle, the degrees and fractions being read off where the level of the liquid cuts the spindle (the temperature of the juice ought to be nearly 27 degrees C.).

We must now assume a figure for the percentage of fibre in the cane. This figure varies, according to variety, age, season, crop, &c., from $6\frac{1}{2}$ to 13, but 10 per cent. may be taken where the exact figure is not known. We thus assume a cane to contain 10 per cent. of fibre saturated with 90 per cent. of juice,

so that the soluble solid matter in cane = Brix of cane-juice $\times \left(\frac{100 - \text{Fibre}}{100} \right)$
 or Brix of cane-juice $\times \frac{90}{100}$

The Brix of the cane-juice or of the cane itself is sometimes used as a means of comparison between two canes. This is fairly correct only so long as we are comparing portions of any *one* particular block or of *one* particular variety, but might be most misleading if we were to compare the cane from one portion of a district with that of another, or were we to compare one variety with another. It by no means follows that the cane with the higher Brix also contains most cane-sugar. As already explained, the quotient of purity is the

* The quotient of purity is the cane-sugar expressed in per cent. weight of soluble solid matter. It will thus be seen that the per cent. Brix multiplied by $\frac{\text{quotient}}{100}$ = per cent. cane-sugar.

ratio of cane-sugar and Brix; this may vary from 65 to 95, so that the per cent. of Brix would have to be multiplied by a number somewhere between 65 to 95

$\frac{100}{\text{ratio}}$ to express the per cent. cane-sugar. For example, let us suppose two canes—A and B—giving 15 and 16 per cent. Brix respectively. Now, the quotient of A might be 94, while that of B might be only 84; A would thus contain a little less than 14.1 per cent. cane-sugar, and B a little less than 13.4 per cent. cane-sugar, because the quotient of the whole cane, as a rule, is a little less than that of the cane-juice expressed as described.

A better method of squeezing the cane would be between two small rollers set in a frame. Such an apparatus would probably cost 40s. or 45s. It would be much better for the farmer to take the few canes to his house and test them there; but there is nothing to prevent him carrying out this work in the field.

The only portable apparatus on the market at present to test the density of the cane in the field is the "Betzonick's Cane Tester." This apparatus consists essentially of an inner perforated brass cylinder about 14 inches long. Fitting tightly into this cylinder is a piston that can be moved up or down by a long brass screw working in a nut on the end of the cylinder. The perforated cylinder is surrounded by an outer cylinder of brass, having attached to one end an apparatus to cut cylindrical sections 1 inch in diameter. The section-cutter may be replaced by a solid brass plate screwing on to the bottom of the cylinder.

In using the apparatus, the piston is screwed up to the top of the cylinder. The section-cutter being in place, sections are taken from the cane or canes to be tested at various places of the stalk. When the inner cylinder is full of cane sections, the cutter is removed and replaced by the solid brass plate. Two hooks are attached to the bottom of the brass plate, which catch conveniently on the tramline or a stick of wood. The piston is screwed down, the expressed juice passing through the perforations of the inner cylinder, and is caught in the outer cylinder, from which it is removed through a small hole into a small tin cylinder. The density of the cane juice is now ascertained by means of a small Brix Spindle, also supplied with the instrument. The cost of this instrument is, I believe, £5 5s. in Sydney.

MANURING OF TROPICAL PLANTS.

ALTHOUGH there is, in tropical Queensland, a large area of virgin soil, eminently suited for sugar, coffee, rice, cotton, &c., still there are lands in the older sugar districts which are practically worked out and which require manuring to bring them back to a state of fertility. We propose, in a series of articles, to consider the question of manuring such lands with different fertilisers, with special reference to nitrates, phosphates, and potash.

German scientists have given much time to exhaustive experiments in this direction, and the following nine articles reproduced from a pamphlet issued by the Verkaufs-Syndikat der Kaliwerke, Leopoldshall-Stassfurt, will be found to contain much that is of value and interest to sugar, coffee, tobacco, and rice growers in the colony.

INTRODUCTION.

One of the most important conditions for the healthful growth of every plant is the presence in the soil of the essential plant-food ingredients in such a form as will ensure their ready assimilation by the plant.

These plant-food ingredients were originally present in the soil in large quantities, although not readily available. The decomposition of these materials takes place more rapidly in tropical and sub-tropical than in temperate regions.

For this reason, the natural production of these soluble ingredients in tropical soil, corresponds very closely to the quantities of plant-food ingredients removed by the various crops, and, as a general rule, the necessity of restoring these materials by artificial means arises sooner in temperate regions than in the tropics.

On the other hand, the restoration, by natural agencies, of plant-food ingredients consumes more time in temperate regions, on account of their slower transformation into a soluble state; the soil is relatively more rapidly exhausted in the tropics, and only by artificially supplying it with the necessary plant-food ingredients can such rapid exhaustion be prevented.

Moreover, complaints about "worn-out" soils are more frequently heard in the tropics than in temperate regions, because, in the latter, rational cultivation is in its prime, whilst in the tropics it is, with very few exceptions, still in its infancy; in other words, the system of continuous cropping is still the leading principle of agriculture in the tropics.

On account of the immense tracts of new land available in the tropics, this system could be followed, to a large extent, without much damage, for as soon as a soil became worn out cultivation could be begun anew on a virgin soil.

For various reasons, this system cannot be so easily put into practice at the present time, and the planters in tropical and sub-tropical regions are accordingly compelled to resort to a rational system of fertilisation, and to supply their fields artificially with the necessary plant-food ingredients that have been withdrawn by continuous cropping for many years. As, however, a system of rational cultivation has been but recently begun, agricultural experiments, which are so necessary to its success, and which have been so useful in temperate regions, are hardly as yet in an advanced stage.

The system of making agricultural experiments owes its development to the recognition of the fact that only through such can we discover the right methods to be pursued in bringing back soils to their former state of fertility.

Therefore, the results obtained from such a system of rational cultivation in tropical regions, although yet few in number, are of great importance, not only in encouraging planters to follow new methods, but also in inducing them to cultivate anew old soils that were formerly regarded as unproductive.

PART I.

GENERAL REMARKS ON TROPICAL MANURING.

Every planter knows that the plant-food ingredients, even in the best soils, will disappear in the course of time. The plants will become less vigorous in their growth, and the yields will consequently diminish in proportion, even in spite of the fact that they may have received the best of care otherwise.

This result is due not only to deterioration in the physical condition of the soil, but also to the loss of certain plant-food ingredients, the presence of which is absolutely essential to the growth of crops. Plants require a large number of elements for their proper nutrition, which are gathered from the air, the soil, and the water in the soil, by means of roots and leaves. The substances taken from the air and water are already present in sufficient quantities, and besides this the earth contains sufficient supplies of those mineral substances which the plants only require in smaller quantities. On the other hand, the supply of the most important plant-food ingredients—*i.e.*, nitrogen, phosphoric acid, and potash—is limited in most soils, as these elements have been principally removed by continuous and vigorous cropping. The three ingredients just mentioned must therefore be artificially supplied sooner or later. In addition to the three substances mentioned, there is also lime and sometimes magnesia. These, however, need only be supplied in certain soils which are deficient in those ingredients.

The object of fertilisation is to supply to the soil, in an assimilable state, those ingredients in which it is deficient. Fertilisers may be divided into several groups, according to their composition and to the effect they produce.

A.—NATURAL FERTILISERS.

Under this heading are included those materials of a vegetable nature which are obtained from the refuse of the kitchen, the excrement of animals, &c., and which contain the ingredients necessary for the growth of plants.

Stable manure plays an important part in agriculture in the countries of the temperate zones, but in tropical regions it is very seldom available in sufficient quantities, owing to the fact that the dairy industry in itself is not much developed; also because the greater portion of animal excrement is lost, the animals, as a rule, not being fed in stables. The manure that is collected consists only of dried dung. The urine, which is much richer in nitrogen and lime, can only be saved through absorption by means of straw and litter, and, of course, this method cannot be practised, unless the animals are fed in stables. Well-prepared stable-manure, in addition to the large percentage of plant-food it contains, exerts a beneficial influence on the mechanical condition of the soil, on account of the litter with which it is mixed. The addition of humus is of the greatest importance in increasing the productiveness of soils, as this substance is very rapidly consumed in tropical climates. When dung and urine are gathered without any litter, a mixture is obtained which contains the plant-food ingredients in an effective form. The application of liquid manure offers many advantages, but, on the other hand, the difficulty and expense of collecting and applying this material should not be lost sight of.

In order to utilise all of the refuse substances, composting may be resorted to, and composts form a very valuable fertilising mixture. The addition of earth, mud, lime, marl, &c., is absolutely essential, in order that the decomposition of the mass may be accelerated. Most planters are familiar with the rules for making composts; it should, however, be mentioned that the fertilising value of the compost can be increased by the addition of potash salts and phosphates—say 65 lb. to 110 lb. of muriate of potash and 110 lb. to 150 lb. of some phosphate to every 35 cubic feet; these should be well mixed and applied between the various layers. If the compost is to be applied to tobacco or sugar-cane, sulphate of potash should be used instead of muriate.

Composts are most advantageously employed in the setting of young trees; for this purpose $5\frac{1}{4}$ to $26\frac{1}{2}$ quarts should be put into each hole, and mixed with good soil. This method ensures more certain growth and a more rapid development of the trees.

As stable manure is not available in sufficiently large quantities in the tropics to make it an important factor in the fertilisation of crops, the preparation of composts is also only possible in few cases. The planter must, therefore, turn his attention to other materials, and first of all to the residues obtained in the manufacture of commercial products from oil-fruits. In this connection may be mentioned cakes made from soja-beans, from earthnuts, castor, palm-kernels, cocoanuts, cotton-seed, olive-oil, sesame, &c., which form important articles of commerce in several countries, and whose great importance in tropical fertilisation is evident. In their effect they occupy a position midway between stable-manure and artificial fertilisers. These cakes should really be classed as nitrogenous fertilisers, on account of their large percentage of nitrogen (2.5 to 7 per cent.) and small percentage of phosphoric acid and potash. The organic nitrogen contained in these fertilisers is very rapidly and completely brought into use, corresponding in this respect to the rapid decomposition characteristic of the tropics. Other and similar residues are leached indigo plants, coffee-shells, &c.

But even these materials are by no means present everywhere in sufficiently large quantities to satisfy the demands of fertilisation, without considering the fact that these substances, especially the oil-cakes, can be employed more rationally and advantageously in feeding cattle. It should, therefore, be the object of the planter to provide a substitute which has no limit placed upon its application, and this substitute is presented to him in the shape of green manuring with potash-phosphate fertilisation.

Leguminous plants furnish the humus required by the soil, and at the same time gather nitrogen from the atmosphere in sufficient quantities. In this way nitrogen is obtained more cheaply than by any other means, and it is, moreover, more valuable in this form than in stable-manure. When green manuring is employed, potash and phosphoric acid should be provided artificially by means of potash-phosphate fertilisation.

"Leguminous plants promote the formation of dew, keep the earth moist, prevent the growth of weeds, loosen the soil, and supply nitrogen to it, accelerate the decomposition of the mineral ingredients contained in the young grain, increase the amount of humus, and properly regulate the fermentation of the soil." (Dr. Stutzer.)

Green manuring ensures the best results on light and sandy soils.

Leguminous plants should be sown in the beginning of the rainy season, and ploughed under about two months later.

Among the leguminous plants suitable for the tropics may be mentioned indigo, earthnuts, soja-beans, and cow-peas (*Dolychos*).

As mentioned above, leguminous plants are fertilised with potash and phosphoric acid, and these ingredients are also beneficial to succeeding crops.

The natural fertilisers previously referred to do not satisfy the demand, for, aside from the limited production of one or the other of them, not one contains the plant-food ingredients in sufficient proportions, and consequently the addition of so-called "artificial fertilisers" is necessary. It is to these that the planter must turn at the present day.

B.—ARTIFICIAL FERTILISERS.

All of the plant-food ingredients mentioned can be purchased separately in the form of artificial fertilisers, and in an available state, so that the varying needs of different soils and plants may be cared for.

I. NITROGENOUS FERTILISERS.

1. Nitrate of soda contains nitrogen in the easily soluble form of nitric acid, which is immediately absorbed by the plant, and is therefore very effective.

2. The nitrogen in sulphate of ammonia is also very soluble, but must be converted into effective nitric acid in the soil; the change goes on quite rapidly in hot climates and calcareous soils, so that the efficacy of sulphate of ammonia is almost equal to that of nitrate of soda.

3. The nitrogen in dried blood, horn-meal, wool-dust, &c., must be converted into ammonia by putrefaction, and then into nitric acid; these fertilisers, therefore, act slowly, but their effect is more lasting. To this class belong the above-mentioned oil-cakes, tankage, bone-meal, guano, &c.

As decomposition takes place much more rapidly in tropical regions than in temperate zones, the organic nitrogen supplied is proportionally of greater value, and will yield the best results, especially when applied to plants which, like sugar-cane, coffee, tea, &c., have a long period of growth.

Investigations conducted by Prof. Wagner, of Darmstadt, have shown that nitrogen is most available in the form of nitrates. To illustrate: If the availability of nitrate of soda be taken as 100, then that of various other nitrogenous fertilisers will be as follows:—

Nitrate of soda	...	...	...	...	...	100
Sulphate of ammonia	...	...	...	...	...	90
Dried blood, horn-meal, oil-cakes in a green (not yet decomposed) state	...	...	...	...	...	70
Steamed, finely powdered bone-meal, fish-scrap, tankage						60
Stable manure	...	...	...	...	...	45
Wool-dust	...	...	...	...	...	30
Ground leather	...	...	...	...	...	20

The above figures may vary somewhat in tropical regions, as the more easily decomposed organic fertilisers are quicker in their action, especially in the case of oil-cakes.

H. C. Prinsen Geerligs* has conducted important experiments at the West Java Experiment Station, regarding the conversion of organic nitrogen into ammonia and nitric acid, the results of which are given in the following table:—

From 100 parts of nitrogen contained in oil-cakes and in sulphate of ammonia were formed in the soil—

The oil-cakes contained—				Old Mouldy Earth-nut Cakes. 5·88 per cent.				Fresh Home-pressed Earth-nut Cakes. 4·03 per cent.				Chinese Soja-bean Cakes. 7·10 per cent.				Sulphate of Ammonia.			
Nitrogen				10·17 ..				20·37 ..				11·80 ..				...			
Fat				19·20 ..				10·80 ..				5·08 ..				...			
Ashes																			
				Nitrate.	Ammonia.	Organic Matter.	Loss.	Nitrate.	Ammonia.	Organic Matter.	Loss.	Nitrate.	Ammonia.	Organic Matter.	Loss.	Nitrate.	Ammonia.	Loss.	
After 1 month	...	...	...	4·8	23·7	64·1	7·4	6·0	27·1	62·1	4·8	2·7	36·7	51·6	10·0	15·3	82·9	1·8	
" 2	"	...	...	19·6	17·4	51·9	11·1	20·0	16·7	53·8	9·5	14·9	31·9	41·1	12·1	47·4	51·1	1·5	
" 3	"	...	...	52·6	1·7	28·2	18·5	44·3	...	41·4	14·3	27·9	21·5	38·5	12·1	89·4	8·0	2·6	
" 5	"	...	...	54·4	8·5	11·8	25·3	72·4	3·8	9·9	14·3	70·3	4·8	12·8	12·1				
" 7	"	...	...	63·7	0·4	10·6	25·3	85·1	...	0·6	14·3	77·9	0·9	5·1	12·1				
" 9	"	...	...	70·1	0·7	3·6	25·3	...	...	...	...	85·2	0·7	2·0	12·1				

From the above figures the following conclusions can be drawn:—

1. Fresh oil-cakes decompose more rapidly than old ones.
2. A difference in the percentage of fat is immaterial, as this material does not prevent the formation of nitrate.
3. Sulphate of ammonia is converted into nitrogen, in the form of nitrate, in the course of three months, without suffering any great loss.
4. Organic (albuminous) nitrogen is gradually converted, by putrefaction, into ammonia, and into nitrogen in the form of nitrate. Available nitrogen is formed in nine months.
5. Under the most favourable circumstances, only 85 per cent. of the nitrogen contained in oil-cakes is available to the plant. The loss is much greater in the case of mouldy cakes, only 70 per cent. being converted into nitrate.
6. In the tropics the availability of nitrogen in good oil-cakes is somewhat greater than Prof. Wagner's figures, so that, in general, a somewhat higher availability of organic nitrogen may be reckoned upon. However, as before shown, differences may occur in proportion as the fertilisers decompose more or less easily.

II. PHOSPHATIC FERTILISERS.

1. Phosphoric acid, soluble in water—as furnished in acid phosphate, containing 14 to 21 per cent. phosphoric acid—is the most assimilable form of this plant-food ingredient. The acid phosphate is manufactured by decomposing slowly soluble crude phosphates by means of sulphuric acid. When liquid phosphoric acid is employed to decompose the crude phosphates, we obtain so-called double superphosphate, containing 35 to 45 per cent. of phosphoric acid, soluble in water. The latter material should be used wherever fertilisers have to be brought from a distance, as its cost is but little higher, and the freight charges only half as much.
2. The phosphoric acid contained in Thomas' slag is not soluble in water, but is very effective, so that we are correct when we say that the phosphoric acid is soluble in the soil. Experiments conducted by Prof. Wagner, Darmstadt, Prof. Maercker, Halle a. S. and others, have proven that the phosphoric acid soluble in a given solution of citric acid produces the same effect as that soluble in water. However, as the solubility in citric acid of the different

* H. C. Prinsen Geerligs: "Jets over de Bemesting van het suikerriet," Archief vor de Java-Suikerindustrie 18

slags varies from 30 to 90 per cent. of the total phosphoric acid, the consumer should purchase a high-grade Thomas' slag—*i.e.*, one containing the highest possible percentage of phosphoric acid soluble in citric acid.

In addition to this quick-acting phosphoric acid, Thomas' slag also contains some that is dissolved more slowly, the effects of which are felt even after some time; this fact is of especial importance in the case of arboreous plants.

Another beneficial effect is produced by the high percentage (30 to 50 per cent.) of lime contained in Thomas' slag, a matter which is especially worthy of consideration with soils deficient in this ingredient.

3. Bone-meal (steamed bones) is very slowly decomposed in the soil, and, according to the latest investigations, produces a much less marked effect than Thomas' slag, though formerly the contrary was believed to be the case. Steamed bone-meal is, therefore, used only when it is intended to enrich the soil permanently. Bone-meal is decomposed in the same manner as acid phosphate, in order that the phosphoric acid it contains may be made available in the form of water soluble phosphoric acid.

III. POTASSIC FERTILISERS.

The potash contained in the ashes of plants is a very good source of this ingredient. However, ashes are placed upon the market in such limited quantities that they do not require special attention, except in rare instances. The principal sources of potash, which is one of the essential plant-food ingredients, are the Stassfurt potash salts; these are placed upon the market in the following forms:—

1. Crude potash salts, being the natural products of the mines. These are furnished in a finely ground state as carnallit, kainit, and sylvinite. In addition to muriate or sulphate of potash, they contain magnesia salts and chloride of sodium (common salt); these latter, however, as a rule, possess but little value for plant-nutrition.

The acids (muriatic and sulphuric) must first be converted in the soil with the aid of lime, and, together with the by-products, worked into the deeper layers, in order that the crude salts may be made available. The effect of the crude potash salts is, therefore, primarily shown in changing the condition of the top soil. The salts absorb moisture from the air, and thereby make the soil moist and compact; this is very valuable in the case of light dry soils, less so in the case of heavy soils. Great caution should be exercised in the application of crude salts to sensitive plants; they injure the burning quality of tobacco and decrease the percentage of sugar in sugar-cane.

On the other hand, crude salt should be applied to plants that consume large quantities of salt, such as cocoanuts; also when it is desired to combat insect-pests, as in cotton. The crude potash salts are preferable to common salt for this purpose, as they supply at the same time one of the essential plant-food ingredients, thus serving a double purpose. When the products have to be procured from a distance, kainit and sylvinite—the latter, as a rule, contains the larger percentage of potash—are preferable to carnallit, as the last-mentioned salt is not only poorer in potash but very readily absorbs moisture. However, as a rule, the application of refined potash salts is more advantageous, as they are much purer, and contain a larger percentage of potash (four to five times as large). On account of the high freight charges to the colonies, the 1 lb. of pure potash is cheaper in the refined than in the crude salts.

2. The sulphates, such as sulphate of potash and sulphate of potash-magnesia, have been successfully applied to all plants, especially to those in which the quality of the yield is of prime importance—*e.g.*, tobacco, sugar-cane, tea, pineapples, and oranges.

3. In all other cases muriate of potash should be employed; it offers the advantage of being somewhat cheaper than the sulphates, while the effect is the same, especially as regards the quantity of the yield.

4. Carbonate of potash-magnesia does not contain any chlorine or sulphur, thus bringing the potash to the plants in a directly available form. This fact is of importance in the case of delicate plants or such as require large amounts of potash during the primary stage of growth.

IV. FERTILISERS CONTAINING TWO OR THREE PLANT-FOOD INGREDIENTS.

1. Nitrate of potash is obtained from East India under the name of "Bengal saltpetre"; it can also be manufactured by converting muriate of potash and nitrate of soda, and the manufactured product is considerably purer and of higher grade. Nitrate of potash contains both nitrogen and potash, is comparatively pure, but rather expensive.

2. Phosphate of potash is a similar product, also containing two of the essential plant-food ingredients—viz., potash and phosphoric acid. These two materials are valuable chiefly on account of their highly concentrated contents of plant-food; the use of these materials, therefore, leads to a considerable saving in freight charges.

3. Peruvian guano, fish guano, and tankage contain chiefly nitrogen and phosphoric acid; they therefore require an addition of potash in order to produce good effects.

V. CALCAREOUS FERTILISERS.

According to Prof. Maercker,* a soil containing less than 0.25 per cent. of lime will always respond favourably to lime fertilisation; one containing from 0.25 per cent. to 0.5 per cent. will probably do so, and the application of lime has produced good results even on soils containing more than 0.5 per cent. of this material.

A sufficient supply of lime in the soil is of the utmost importance, as it not only is a valuable plant-food ingredient, but also improves the physical condition of the soil. Should the soil be deficient in lime, the planter should not fail to supply this ingredient artificially.

Sour and heavy soils are neutralised and loosened by lime, and are thus more easily worked, and produce better yields. Furthermore, lime hastens the process of decomposition going on within the soil, causing the more rapid conversion of humus into carbonic acid, and accelerating the formation of nitrate. Lime is of much importance in assisting in the decomposition of potash salts, but this action will deplete the soil of its supply of lime; 220 lb. of potash salts convert and force into the lower depths of the soil about an equal quantity of lime.

Among calcareous fertilisers the following deserve mention:

1. Marl, which contains from 10 to 70 per cent. of carbonate of lime, according to the nature of the substance, so that the amount of marl required depends upon the percentage of carbonate of lime it contains. In order that lime may produce the best effect, 2,000 lb. to 5,000 lb. of carbonate of lime must be applied to the acre. Recently, finely ground limestone has been applied with success to light soils.

2. Freshly burnt lime consists of quicklime which absorbs moisture from the atmosphere and then falls to a fine powder. The material acts much more vigorously in the soil than carbonate of lime, and is therefore to be preferred, especially on heavy soils. 2,000 lb. to 3,500 lb. of slaked lime will satisfy the needs of the soil for from four to eight years. In the case of light soils, it is more advantageous to apply smaller quantities at shorter intervals.

3. Plaster or sulphate of lime does not produce a very favourable effect upon the soil. As this material only dissolves certain plant-food ingredients in the soil, it is only natural that its application should be but temporarily or partially successful.

* Prof. Maercker, *Die Kalidüngung*, Berlin 1893 p. 32.

TABLES GIVING THE COMPOSITION OF THE MOST IMPORTANT FERTILISING MATERIALS.*

Name of Material.	Nitrogen.	Phosphoric Acid.	Potash.	Organic Matter.	Water.
I. Stable manure (animal manure)—					
Fresh manure (with straw)—					
Horse	0.58	0.28	0.53	25.4	71.3
Cow	0.34	0.16	0.40	20.3	77.5
Sheep	0.83	0.23	0.67	31.8	64.6
Pig	0.45	0.19	0.60	25.0	72.4
Common stable manure (fresh) ...	0.30	0.18	0.45	21.2	75.0
„ „ (partially rotten) ...	0.50	0.26	0.63	19.2	75.0
„ „ (strongly rotten) ...	0.58	0.30	0.50	14.5	79.0
Liquid manure	0.15	0.01	0.49	0.7	98.2
Poudrette	0.55	0.28	0.20	3.0	95.5
Hen dung	1.63	1.54	0.85	25.5	56.0
Pigeon dung	1.76	1.78	1.00	30.8	51.9
II. Nitrogenous fertilisers—					
Nitrate of soda	15.5	...	...	...	2.6
Sulphate of ammonia	20.5	...	...	...	4.0
Dried blood	11.8	1.2	0.7	78.4	13.4
Horn-meal	10.2	5.5	...	68.5	8.5
Oil cakes—					
Earth-nut cakes	7.6	1.3	1.5	85.6	10.4
Chinese Soja-bean cakes... ..	6.9	1.5	1.1	83.0	11.9
Cotton-seed cakes... ..	6.2	3.1	1.6	82.2	11.2
Sesame cakes	5.9	3.3	1.5	79.5	11.1
Cocoanut cakes	3.7	1.3	2.0	82.0	12.7
Wool dust	5.2	1.3	0.3	56.0	10.0
III. Phosphatic fertilisers—					
Acid phosphate... ..	...	14—21	...	...	...
Double superphosphate	...	35—45	...	...	...
Bone-meal (normal)	4.0	20—25	...	30.0	6.0
Thomas' slag	...	15—21	...	...	...

* From the average analyses of Dr. E. v. Wolff, "Praktische Düngerlehre," 12 Edition, Berlin, Paul Parey, 1892. This publication gives more exact figures for a great number of fertilising materials.

IV. POTASSIC FERTILISERS.

Total Composition of the Stassfurt Potash Salts.*

Name of Salt.	Sulphate of Potash.	Muriate of Potash.	Sulphate of Magnesia.	Chloride of Magnesia.	Chloride of Sodium.	Sulphate of Lime (Gypsum).	Insoluble in Water.	Water.	Content of Pure Potash.	
									Average.	Guaranteed.
100 parts contain	K2 SO4	K Cl	Mg SO4	Mg Cl2	Na Cl	Ca SO4				
A. Crude salts (natural products of the mines).										
	23.6									
1. Kainit	21.3	2.0	14.5	12.4	34.6	1.7	0.8	12.7	12.8	12.4
2. Carnalit	...	15.5	12.1	21.5	22.4	1.9	0.5	26.1	9.8	9.0
3. Sylvinit	5.2	28.3	3.6	1.8	51.3	1.8	4.2	3.8	20.7	15.0
B. Concentrated salts (manufactured products).										
(a.) Sulphates-nearly free from chlorine.										
1. Sulphate of potash { 96%	97.2	0.3	0.7	0.4	0.2	0.3	0.2	0.7	52.7	51.8
90%	90.6	1.6	2.7	1.0	1.2	0.4	0.3	2.2	49.9	48.6
2. Sulphate of potash mag-	50.4	...	34.0	...	2.5	0.9	0.6	11.6	27.2	25.9
nesia										
(b.) Salts containing chlorine.										
4. Muriate of potash { 90/95%	...	91.7	0.2	0.2	7.1	...	0.2	0.6	57.9	56.8
80/85%	...	83.5	0.4	0.3	14.5	...	0.2	1.1	52.7	50.5
70/75%	1.7	72.5	0.8	0.6	21.2	0.2	0.5	2.5	46.6	44.1
5. Calcined manure salt										
(high grade)	...	44.5	22.5	4.6	12.4	2.9	5.3	7.8	28.1	20.0
6. Calcined manure salt										
(low grade)	...	25.6	31.1	6.3	10.3	3.5	10.6	12.6	16.2	15.0
	Bicarbonate of Potash.		Carbonate of Magnesia.							
Carbonate of potash magnesia ...	40.0		33.6		1.0			25.4	18.8	13.5

* According to numerous average analyses made by the "Verkaufs-Syndikat der Kaliwerke," Leopoldshall-Stassfurt.

V. FERTILISERS CONTAINING TWO OR THREE PLANT-FOOD INGREDIENTS; AND A FEW IMPORTANT REFUSE MATERIALS.*

Name of Material.	Nitrogen.	Phosphoric Acid.	Potash.	Organic Matter.	Water.
Phosphate of potash	...	36—38	25—27	...	...
Nitrate of potash	13·5	...	44·0	...	...
Peru guano (available)	7·0	11	4·0	30·0	16·0
Fish guano	8·5	13·8	0·3	56·2	9·8
Tankage	5·8	17·4	0·3	49·1	8·0
Ashes, leaved wood	...	3·5	10·0	...	...
„ coniferous trees	...	2·6	6·0	...	...
„ soft coal	...	0·2	0·2	...	...
„ lignite... ..	...	0·6	0·7	...	...
„ peat	...	1·2	0·5	...	...

* From the average analyses of Dr. E. v. Wolff, "Praktische Düngerlehre," 12. Edition, Berlin, Paul Parey, 1892. This publication gives more exact figures for a great number of fertilising materials.

THE BRAZILIAN PROCESS OF "SMOKING" RUBBER.

A DESPATCH, dated 14th May last, has been received at the Foreign Office from H.M. Chargé d'Affaires at Rio de Janeiro, enclosing Report of H.M. Acting British Consul at Para on the method at present employed on the Amazon River of coagulating the milk of the rubber-tree by a smoking process.

The report states that the juice or milk of the *Hevea Braziliensis* may be caused to coagulate by various means. By the addition of a solution of alum, sodium, chloride, or various other salts, or by simply allowing the milk to stand exposed to the air for twenty-four hours, or by artificial evaporation, the watery portion may be separated from the solid residue known to commerce as Indiarubber or Caoutchouc. To produce, however, a substance having that consistency and elasticity which is desirable, it is of the first importance that this coagulation should take place in such a way that as little water as possible remains in the mass.

When the milk is allowed to coagulate by simply standing in contact with the air, a considerable amount of water remains in the mass—the rubber is flabby, inelastic, and deteriorates rapidly. It is classed together with scraps and *débris* as "sernamby," and fetches but a low price. When alum is used, the result is better. In the province of Matto Grosso the milk is always treated with that reagent, and the rubber fetches but 3d. or 4d. per lb. less than the finest Para rubber. The best rubber, known as Para fine, is produced, however, by rapidly evaporating the juice in the smoke produced by burning the nuts of the Urucury Palm (*Attalea excelsa*). This is effected by throwing a quantity of the nuts on a small wood fire; a dome-shaped vessel is then inverted over this fire, and the smoke pours out through a hole at the top of the dome. A piece of wood, sometimes cut to the shape of a rough paddle or spoon, is dipped into the milk, and then held in the smoke until the viscous liquid has dried, leaving a layer of rubber on the stick. The stick is then dipped again into the liquid, and the process repeated until layer by layer a large pellet of rubber is built up.

The exact action of the smoke has not yet been satisfactorily explained. It is probably due, however, to the acid (pyroligneous) present in the smoke. All the apparatus employed may be seen in the Kew Museum. But there is no doubt that the milk thus treated yields a very elastic, and at the same time, firm rubber that is free from all tendency to flabbiness, and does not lose weight when stored. The smoke of an ordinary wood fire is found to produce what is known as "wet rubber," that loses from 5 to 10 per cent. in weight whilst in the hold on the way to Europe. A considerable amount of rubber is, however, probably prepared by this means in localities where the Urucury palm is scarce.

The method of smoking, though very primitive, enables a man to prepare as much as 10 to 15 kilos in one hour.

The good effects produced by the smoke of the Urucury nuts are probably due in part to the fact that the smoke is a dry smoke; but it seems probable that there is also some chemical reagent at work, the nature of which has not yet been ascertained.

A machine, designed on the principle of a centrifugal cream separator, to separate the watery portion of the milk, has been tried, but without good results at present.

A feasible method would be to dissolve the rubber in some liquid that will not mix with water. Carbon bisulphide, for instance, if it could be sufficiently cheaply produced, might revolutionise the present somewhat primitive system.—*Practical Engineer*.

CULTIVATED LAND IN INDIA.

To give an idea of the enormous areas with which the Indian Director-General of Statistics has to deal, the *Tropical Agriculturist* (Colombo) gives, first, the total net area of territory by professional survey, deducting feudatory and tributary States and areas for which no return exists. That area amounts to 537,000,000 of acres! Under forests, 64,000,000; not available for cultivation, 154,000,000; cultivatable waste, 95,000,000; fallow land, 47,000,000; area from which crops were taken, 177,500,000; area irrigated, 29,000,000. Next we have the different crops: Rice covers 66,250,000 acres; wheat, over 16,000,000, and the total under food grains was no less than 160,000,000 acres. Under oil seeds, 10,500,000; cotton, 9,500,000; jute, 2,250,000; other fibres, 691,000 acres; sugar, 2,750,000; indigo, 1,500,000; tobacco, 1,000,000; fodder crops, 2,000,000; opium, 601,000 acres; coffee, 147,158 acres; tea, 423,732 acres. Taking all India into account, there are 290,000 acres under coffee cultivation, and 470,000 under tea.

If we consider the area under coffee and connect it with the exports of coffee for 1897-8, we must arrive at the conclusion that much of the land under coffee is unproductive, only 225,008 cwt. having been shipped. This shows that the yield only reached about 86 lb. per acre. It is surmised, however, that there is a far larger local consumption of coffee in India that has hitherto been credited. The *Tropical Agriculturist* is inclined to put it down at 150,000 cwt., but even then we should not get an average yield over all the coffee area of $1\frac{1}{2}$ cwt. per acre.

It is interesting to compare the enormous areas of land in India with those of Queensland in their relation to tropical agriculture. In India there are 537,000,000 acres, of which 257,000,000 are under crop; in Queensland, roughly, 448,000,000 acres. Of this area, 59,875 acres are under wheat; 2,067 under barley, and 1,834 acres under oats; 48,220 acres are devoted to hay crops, and 19,903 acres to green fodder; sugar, 98,641 acres; coffee, 311 acres; tobacco, 755 acres; rice, 445 acres; maize and grain crops, other than wheat, barley, and oats, 104,982 acres; potatoes, 8,197 acres; vines, 1,881 acres; fruit trees, bananas, &c., 7,024 acres; other crops (pineapples, small fruits, &c.), 8,197 acres. There are, besides, plantations of cocoanuts on various islands on the coast, carrying 2,560 trees, many of which are bearing.

The total area under cultivation in Queensland is 386,259 acres, with 14,402 acres in fallow and 15,643 acres under permanent grasses—a grand total of 416,304 acres; or about $\frac{1}{3000}$ th of the area cultivated in India.

When we turn to the respective populations, we find that India, with her population of 295,000,000, has '8 (or $\frac{8}{9}$) of an acre of cultivated land per head; whilst Queensland, with 460,000 souls, shows nearly 1 acre cultivated per head of the population.

Such statistics are interesting, as showing what can be accomplished by the British race in an almost tropical climate like the greater part of Queensland.

SUGAR STATISTICS.

THE statistics of the Queensland sugar industry during the year 1897 are now available, and, as usual, in the month of September, we take our final glance at the progress or otherwise of the year which nominally closes at the end of the previous June. Comparing the results, as ascertained by us last January, we find the product of our canefields was 97,916 tons, as against the 91,300 estimated by us. This was taken off 65,432 acres, giving an average of 1.50 tons to the acre, as against 1.51 tons for 1896, 1.516 being the average for the past ten years. The total area under cane last year (omitting what was grown for feed) was 98,641 acres, an increase of 15,548 acres, or 18.7 per cent., as against an increase of only 7 per cent. in 1896. The Queensland cane crop now covers 26.5 per cent. of the whole cultivated area in Queensland, and is nearly equal in extent to maize, which occupies 109,721 acres, or 29.5 per cent. of the whole. Wheat, though greatly increased in area, still lags a bad third, with 15 per cent. as its proportion of Queensland agriculture. But the most remarkable feature of 1897, due to the generally unfavourable meteorological conditions, was the large area of cane allowed to stand over. In 1896 it was 27 per cent., an increase of 9 per cent. on the previous year, but in 1897 standover cane totalled no less than 33 per cent. of the whole, an enormous amount which bears eloquent testimony to the unsatisfactory development of the crops. The value of the sugar produced in 1897 was less than that of the previous year. Taking sugar at the basis of 88 per cent. net titre, the refiners paid only £8 18s. 5d., as against £9 17s. in 1896, a reduction of 18s. 7d. Consequently the value of sugar per acre was £13 7s. 7d., as against £14 18s. 5d. in 1896. Seeing that the average cost of producing a ton of sugar is over £8, equal to not less than, say, £12 10s. per acre, it is clear that the 1897 profits, even under the most favourable circumstances, afforded little margin for extras or deficiencies. The total value of the sugar produced of course shows a decrease, being £873,900, as against £924,097 in 1896. The decrease is considerable, though it can be readily accounted for in the smaller production and the lower price obtained by the manufacturers. The sugar machinery imports, valued at £13,372, paid £1,436 in duty, though this sum does not cover the amounts paid on machinery used in sugar-mills, but not exclusively so, while of course there were large imports of bags, lubricants, tramway material, &c., which are not distinguishable from similar imports used in other industries. The declared value of the sugar exported from Queensland naturally receded with the lessened production, the figures being £681,038, against £863,080 in 1896, and £896,118, £886,834, and £753,983 in the three previous years, respectively. The destination of our sugar varies a little from previous years, as the following comparison will show:—

	1897.	1896.	1895.	1894.
	Tons.	Tons.	Tons.	Tons.
United Kingdom	Nil	51 $\frac{3}{4}$	51	500
New South Wales	23,789 $\frac{1}{4}$	33,588 $\frac{3}{4}$	27,714 $\frac{3}{4}$	48,200
Victoria	33,495	32,838 $\frac{3}{4}$	27,750 $\frac{1}{2}$	9,506 $\frac{1}{2}$
South Australia	81 $\frac{1}{2}$	2,030 $\frac{1}{4}$	3,988 $\frac{1}{4}$	461
Western Australia	23	54 $\frac{1}{2}$	29 $\frac{1}{2}$	97
Tasmania	225	465	133 $\frac{1}{2}$	175
New Zealand	4,774	6,325 $\frac{3}{4}$	7,515	6,148 $\frac{1}{2}$
Other countries	30	20 $\frac{1}{4}$	23	21 $\frac{1}{2}$
Total	62,417 $\frac{3}{4}$	75,375	67,205 $\frac{1}{2}$	65,109 $\frac{1}{2}$

From the above it will be seen that imports direct to South Australia have practically ceased, due probably to the purchase by the C.S.R. Company of a large factory, hitherto making plantation whites for the open market. The number of sugar mills and refineries remained as before—namely, 81; but the value of the machinery and plant has increased by no less than £800,000, the figures being £2,067,867, against £1,219,672 last year. This gives an average value of each factory of £25,000, a figure probably more nearly correct than

that given last year, which was only £15,000. These factories and refineries employed 3,715 hands, as against 3,796 in the previous year. In addition to the foregoing we know that 8,000 coloured men were employed in field work, and the increased acreage under cane points to an augmentation of the number of over 2,000 farmers engaged in cane-growing. Every year the number dependent upon the sugar industry increases, until it becomes safer to await the census than attempt to hazard guesses. In the following table appears a summary of the more important figures, compiled from official sources :—

	SUGAR-MILLS.							DISTILLERIES.	
	No. of Sugar-Mills.	Acres under Cane.	Acres of Sugar-cane Crushed.	Quantity of Sugar Manufactured.	Average Sugar per Acre.	Quantity of Molasses Manufactured.	Mill-hands Employed.	No. of Distilleries.	Quantity of Spirits Distilled.
		Acres.		Tons.	Ton.	Gallons.			Proof Gal.
1889—89	106	47,340	30,821	34,022 $\frac{1}{2}$	1·07	722,162	*	10	73,068·1
1889—90	125	49,741	31,239 $\frac{3}{4}$	44,411 $\frac{1}{2}$	1·36	942,837	*	11	129,228
1890—91	110	50,922	39,435	69,983 $\frac{1}{2}$	1·69	1,640,663	*	9	177,347·7
1891—92	68 ^a	50,948	36,821	51,219	1·39	*	*	9	192,051
1892—93	72 ^a	55,815 ^b	40,572	61,368	1·51	1,343,281	2,543	9	181,302·2
1893—94	61 ^a	59,667 ^c	43,670	76,146	1·74	269,169	3,169	7	187,302·2
1894—95	62 ^a	71,818	49,839	91,712	1·84	956,276	3,846	6	102,679
1895—96	64 ^a	77,247	55,771	86,255	1·55	1,730,591	3,557	5	111,034
1896—97	81 ^a	83,093	66,640	100,774	1·51	2,195,470	3,796	5	105,826
897—98	81 ^a	98,641	65,432	97,916	1·50	2,364,020	3,715	5	101,763

* Not ascertained. ^a Mills for crushing cane only, excluded. ^b Including 295 acres for green food. ^c Including 416 acres for green food.

—*Mackay Sugar Journal.*

THE BETZONICK TESTER.

A CORRESPONDENT, writing to the *Sugar Journal* on the Betzonick Tester, says :—

In the last issue of your journal I see a letter signed “J. Y. B.,” dealing with the use of the cane-tester, and, as it seems to indicate that some misunderstanding prevails as to the real object of such instrument, I would ask you to kindly oblige me by publishing the following remarks in your August issue.

The apparatus is intended to be a guide for ascertaining the approximate quality of sugar-cane, and is also supposed to help in improving the education of the growers in this particular branch, as the figures obtained thereby (through the proper method of sampling as directed) and in connection with the experienced eye indicate, with quite sufficient correctness, all that is required to enable the grower to obtain—for all practical purposes—as reliable an opinion as possible.

The readings of the saccharometer, which may be worked out by anybody without any particular knowledge, will form an index to a more thorough investigation of quality in general—various varieties—proper cutting time, selection of plants, cane grown on various soils, &c., &c.; and thus it will help to train the grower and perhaps afterwards open up the road to a more advanced chemical knowledge.

I quite agree with “J. Y. B.” that cane often varies in the same field, but does not this also influence the mill-roller sample? Is it not quite possible that several early obtained samples in the field may form just as reliable an idea of quality, at least for all practical purposes.

The C.S.R. Company would scarcely use and recommend the instrument to the growers had they not first convinced themselves as to its reliable work; and as the price may be rather much for one farmer to invest for such purposes, two or three may easily join together and share the cost.

MAFFRA (PORTUGAL) BEET SUGAR COMPANY, LIMITED.

THE following is the report of the Maffra Beet Sugar Company, Limited, for the half-year ending 30th June, 1898:—

Since the publication of the last report and balance-sheet, presented to you in February of this year, the factory building and the erection of the machinery have been completed.

The technical staff, selected by Mr. J. M. Sinclair and the Brunswick Machinery Company, arrived here in March; and on 21st April the first beets were put through. Owing to the unprecedentedly severe season, which yielded practically no rain from the time of sowing until nearly harvest time, when it came too late, and caused a renewed growth of the plants to the detriment of their sugar contents; so that the beet crops were, to a certain extent, a failure, and only 9,109 tons 12 cwt. of clean beets were available during the whole campaign. This fact your directors greatly deplore, but over which, of course, they had no control. During the working campaign sundry stoppages had to be made for want of raw material and various other unavoidable causes, amongst which the principal blame is attachable to wet weather, which caused delays and irregularities in the beet supply. 504 tons 16 cwt. white granulated sugar have been manufactured, and it is very gratifying to be able to report that the whole of it has been sold at highly satisfactory prices.

Besides what has been sold, there remain in stock about 110 tons of sugar in the syrup, and about 50 tons of molasses, now sold, and another parcel of about 500 tons of molasses which will be available about January, 1899, for sale, after the sugar contained therein has been extracted, during the after campaign then to be entered upon.

Your directors have devoted considerable time to the business of the campaign, some of them having continually been attending at the factory during the trial week's work of the machinery before taking it over from the Brunswick Machinery Company. This has now been done, and a satisfactory arrangement with that company has been made for the payment of the balance due on the machinery.

It is hopefully anticipated that this coming season, which promises well so far, will more than make up for the loss that was sustained during the past season, the experience of which has induced your directors to somewhat modify the methods to be adopted in the next season, both in the field as well as in the factory, in order to ensure better results.

Your board, finding it necessary to have more funds at its disposal, decided to sell an additional number of shares, which have now been taken up.

Finally, it is the belief of your directors that next season's work will prove a financial success. The first year's work has shown that the undertaking, under certain conditions, can be made a profitable one, and they certainly will leave no stone unturned to bring about that object.

A. McLEAN, Chairman.

FRED. G. BARLEY, Secretary.

Maffra, 25th July, 1898.

NEW DISCOVERY IN SUGAR-MAKING.

THE *Times Union* and *Citizen* says:—Professor Stockbridge, the chemist at the State Agricultural College, has made a discovery which will alone richly repay to our people all the cost of that institution. The following facts have been thoroughly tested by experience, admitted by experts, and will carry a valuable lesson to every homestead in the State:—

If the cane juice as it flows from the mill be filtered through common Spanish moss, green from the trees on which it grows, and then boiled even in an open iron vessel till crystallisation occurs, that need only to be crushed to make the "coffee sugar" of commerce. The colour is slightly tinged with a cream tint, and it is sweeter than ordinary sugar.

Now, in these facts, rightly used, there lies a declaration of independence for every Florida farmer, and still another proof that brains applied to our climate and soil need pay no tribute to Cuba or Hawai, or any power or potency under God's footstool. No new principle is involved. Brown sugar is unsightly, because it is not clarified—the moss is only the best clarifier for eliminating impurities and making a large per cent. of the sugar available for household use in an agreeable form.—*Louisiana Planter*.

COFFEE IN QUEENSLAND AND OTHER PARTS.

No. 3.

By JOHN DANSEY,
Manager, Mackay Coffee Estate Co., Ltd.

Draining.—To prevent wash, all lands in any way inclined to steepness should be drained as soon as possible after the burn has taken place; drains should be about 15 inches x 15 inches in size, and cut across the field at a gradient of about 1 in 18 and about 45 feet apart. Drains cut at the above angle will generally keep themselves clean. In draining, endeavour when practicable to carry your drain into the nearest ravine, and avoid as much as possible putting in up and down drains; the latter soon wear away to such an extent as to become, after one or two wet seasons, huge unsightly crevasses, the sides of which continually keep falling in, and carrying away many valuable coffee-trees planted near by.

Manuring.—To obtain good crops it is as necessary to attend to the manuring of coffee as it is to any other branch of agriculture; wide divergencies of opinion exist among practical planters as to the best and most economical way of applying manures to the coffee-tree. Deep-hole manuring and surface manuring are both practised in Ceylon. The former consists of cutting a hole about 2 feet square above each coffee-tree, and filling it with manure which has previously been well mixed with the soil taken from the hole. All kinds of manures are used in this manner—cattle-dung, coffee-pulp, composts of various kinds, consisting principally of ravine soil, mixed with lime, ashes, &c., &c. This method of manuring cannot in any way recommend itself to Queensland planters, as the cost of cutting the holes, the carrying and application of the bulky manures, would render it far too expensive. Surface manuring, on the other hand, besides being, in my opinion, far more effective in its actual results, cannot be considered in any way costly as compared to the former. Cattle-dung, coffee-pulp, and composts can be equally well applied on the surface as under it, but, as their bulky nature will not allow of their being carried any distance, only trees in the immediate neighbourhood of the manure heaps should be so treated. Such manures as steamed bones, or bone-meal, superphosphates, poonac (the refuse from the cocoanut after the oil has been extracted), guano, blood manure, &c., are all excellent manures for coffee, and are especially applicable to surface manuring. These should, however, be judiciously applied. Guano, for instance, should only be given in very small quantities, and even then well mixed with other manures such as bones. In surface manuring, all that is required is to scrape away the soil from around the tree to the depth of about $2\frac{1}{2}$ to 3 inches, and to a width of about 3 feet. The manure to be applied is then spread all round and covered up again with the soil previously scraped off. If using bulky manures, a bushel to a tree would be necessary, whereas in mixtures of bonedust, blood manures, or guano an ordinary jamtinful would be considered ample.

Littering.—No better method can be pursued at all times than to cover the ground round and about the trees with a heavy coating of thatch. This surface littering (mulching—*Ed.*) has a most marvellous effect on the coffee-tree,

and will cause it to throw out much wood and bear heavily. Planters in Queensland who are fortunate enough to have any grass land near at hand would do wisely by littering, for not only does it prevent the growth of weeds, but the decaying grass causes the ground to retain its freshness for a lengthy period, which advantages will be at once apparent to those who have yearly to put up with many months of drought.

The Curing of Coffee.—As soon as possible after being brought in from the field, the ripe coffee (cherry) is run through the pulper. This machine performs only one function in the curing of coffee—that is, in removing from the coffee-beans the outer skin called pulp; as the cherry is put through the chops of the pulper, the pulp is forced backwards and is allowed to run into some adjoining pit, afterwards to be used as manure, whilst the bean itself, on being released from the chops, finds its way into a large cistern, of which there are generally two, also one washing cistern and one cistern called the tail cistern. These cisterns are made of solid masonry, and are of various holding capacities, according to the quantity of cherry likely to be put through the pulper daily. For an estate yielding up to 600 bushels per day, cisterns measuring 22 feet by 10 feet by 3 feet will be sufficient. These cisterns are all fitted with slide doors, so as to allow the coffee to be run in from one to the other—*i.e.*, from the fermenting cistern to the washing cistern, and also to allow of any light coffee to be passed from the washing cistern to the tail cistern. After the day's picking has been put through the pulper, and the coffee, which is now called parchment, has all been safely run into the receiving cistern, it is then allowed to ferment for a period of from twenty to thirty hours, according to temperature. This fermentation, serving to loosen the saccharine matter from the parchment, is naturally of a very gentle description, and should be very carefully attended to, so as not to in any way interfere with the colour of the bean itself. The fermentation completed, water is then let in to the cistern, and the whole of the parchment passed through the slide door into the washing cistern, when more water is let in, and the whole receives a thorough washing, for which purpose an instrument resembling a wooden rake is used, with this difference: That instead of having teeth, this one has none, and is simply a board about 2 feet long by 5 inches wide, into which a handle about 5 feet long is attached. As the parchment is being washed backwards and forwards, all skins and light beans will become separated from the sound and heavy ones, and will rise to the surface to be skimmed off and passed into the tail cistern. The washing being completed, the parchment coffee is then put out to dry in the sun; wire matting is generally used for this purpose on which to dry it. It should not be laid out deeper than from 2 to 3 inches, and turned several times a day. From five to six days' thorough drying will be required before it is fit for peeling—*i.e.*, having the parchment and silverskin removed. In Ceylon this latter process is invariably carried out in Colombo, as the atmosphere in the hilly coffee districts of the island is too humid to allow of the parchment being sufficiently dried for the purpose. The whole of the parchment coffee in Ceylon has therefore to be sent down in bags to the various coffee-mills in Colombo, and after further drying in the sun is put through the peelers, winnowers, and sizers, and finally packed and shipped as No. 1, No. 2, peaberry, &c., according to quality; and so extremely careful is the shipper to ensure the contents of his parcels being of uniform grade, that the whole of the beans, as received from the sizer, are again gone over by hand, and all deformed or broken beans rejected—a matter of much importance in most markets of the world, where colour, size, and uniformity form the great desiderata.

Conclusion.—From the foregoing articles the intending planter may learn much of the essentials of coffee-growing; but as these articles, necessarily brief, lay no claim to be a complete treatise on coffee-growing, it must not be assumed that a mere judicious comprehension of the instructions given is all that is to

be learned. In every stage there are new developments and features varying with circumstances, each and all of importance not to be overlooked. Besides, it must be borne in mind that instructions applicable to Ceylon, frequently cited by me by way of illustration, may not be wholly applicable to Queensland, where climatic conditions differ in many respects. And here I must reiterate that every planter in this colony, guided as he may be by the fundamental teachings of other coffee-growing countries, must, to be successful, apply common sense and discrimination under all conditions. He must give and take, not blindly binding himself to the dead letter of the practices of his brother planters in Ceylon or elsewhere. Success in coffee-growing cannot be mastered in a few lessons, or by the teaching embodied in a few magazine articles; it is a study and experience that with each crop finds many augmentations. There was a depth of truth given by an old Ceylon planter when asked by a creeper, or new chum, if there was much to learn in coffee-growing—"I'm learning something every day, though I have had thirty years at it"; and such will be the experience of every planter here if he is, as he ought to be, keenly observant of his plants day by day throughout the year. No standard rules, without some variations, can be laid down applicable to all situations, aspect, rainfall, windage, &c.; all must be gauged and interpreted according to the position and general location of the field—whether low land or mountain slope.

There is too great tendency among farmers in this colony to concentrate their time and energies to the cultivation of only one or two marketable products, whereas many, and especially those who have large families, would find their incomes considerably increased by the addition of an acre or two of coffee. The requisites necessary for the preparation of the product for the mill are so simple and inexpensive that they are within the reach of all. It must have occurred to those who have followed these articles from the beginning that it is not necessary for every grower to erect a mill for his own crop. One mill in each district is ample for all purposes, as coffee in the parchment state will stand holding for an indefinite period, provided it has been sufficiently dried, nor need the farmer apprehend that such delay will cause depreciation in its value, for the contrary is the case. The farmer in Queensland can choose his own time for sending his parchment to the mill, where he could either sell for cash or have the article cured, packed, and shipped for him.

This same principle is carried on with great satisfaction in most of the coffee-producing countries, and should answer equally well here.

The foregoing concludes for the present the very interesting articles on coffee-growing in this colony, which are the result of Mr. Dansey's long experience in Ceylon, combined with much that he has gained by practice and observation in Queensland. As the writer says, the articles do not form a complete treatise on coffee-growing, but we recommend all farmers to read the articles attentively, as by their help they will certainly be enabled to add to their incomes with comparatively small outlay.

We should like to see every farmer, whose lot is cast in a suitable locality, add at least an acre of coffee to his cultivation ground.—Ed. *Q.A.J.*

COFFEE LANDS IN QUEENSLAND.

SINCE the various articles on coffee-planting in Queensland have appeared in the *Journal*, many inquiries from oversea have been made concerning land suitable for coffee-growing at Mackay and other portions of tropical Queensland. That the articles in question have attracted much attention is evidenced by a communication we have received from Mr. J. Dansey, Manager of the

Mackay Coffee Estate Company's Plantation, who says that numerous letters have reached him from India, Ceylon, and the Straits regarding the prospects of coffee in Queensland, "which shows plainly that the *Queensland Agricultural Journal* is read by many and in very outlandish places."

There is a number of people now at Mackay on the lookout for coffee lands, and Mr. Dansey has no doubt that before long the neighbourhood will be a great district for its cultivation. The last article of that gentleman's series on coffee-growing appears in this issue.

Queensland Agricultural College.

A SUCCESSFUL STUDENT.

ON Thursday, 6th October, at a ploughing match held at Forest Hill, Student Arthur Dyne, of Gympie, succeeded in carrying off the first prize for ploughing in the match for youths under eighteen. Mr. Dyne has up to the last six weeks had very little practice in any but the roughest ploughing, and his progress since he went into training at the College ten days before the match was remarkable. The Principal, Mr. Mahon, took great interest in his instruction, and placed him under the care of an experienced ploughman, Mr. J. Dowling, who coached his pupil to such good purpose that Dyne carried off first honours, out of three competitors, one of whom had taken the first prize last year. Competent judges declared that Dyne's work was equal to that of such champion veteran ploughmen as Macalister, Tuckett, and Baulch. The judges awarded points to Dyne, 20; to Bowman, 14; to Beetham, 12.

In the competition for the straightest furrow, Dyne did not enter, being satisfied with his honourable achievement. Young Bownan took the prize for this work, his furrow being as straight as if drawn by a rule.

The horses used by Mr. Dyne were a splendidly matched pair of bays, very powerful and steady, and quite unconcerned about the crowd of people who were about. They were entered for the competition for best pair of plough horses, although, of course, not for the purpose of taking any money or other prize against farmers' horses. These deservedly received honourable mention.

The ploughing match was very successful, and attracted a large number of local visitors, as also many from Ipswich, Rosewood, and Toowoomba.

Animal Pathology.

THE APPLICATION OF THE TUBERCULIN TEST TO THE DAIRY CATTLE ON THE ISLAND OF ST. HELENA.

REPORT by Mr. C. J. POUND, Director of the Queensland Stock Institute, to the Chief Inspector of Stock.

HISTORY OF THE HERD.

FOR upwards of twenty years the dairy cattle on the island of St. Helena were a mixture of the ordinary milking Shorthorns and the Illawarra breed.

In 1892 steps were taken to improve the herd by the introduction of a number of pure-bred cows and a bull of the Ayrshire breed. Since then several fresh Ayrshire bulls from some of the best imported stock have from

time to time been introduced. By gradual culling and systematic selection, Mr. Bowden, who has charge and management of the herd, intends at an early date to have nothing but pure-bred Ayrshires on the island.

At present the herd is constituted as follows:—

23	Pure-bred Ayrshire cows.
18	„ „ heifers.
1	„ „ bull (adult).
6	„ „ bulls (under one year old).
10	Illawarra and cross-bred cows.
10	„ „ heifers.

Total, 68

The first positive evidence of the existence of tuberculosis in the herd came under my notice as follows:—On the 12th July, 1895, three years ago, I was instructed by the Hon. the Colonial Secretary to proceed to the island of St. Helena to examine and report on two cows that were suspected to have died from eating some indigenous poisonous plant. The *post-mortem* and a microscopical examination revealed the fact that the immediate cause of death was symptomatic anthrax or “blackleg.” At the same time it was noticed that the oldest animal (a pedigree Illawarra cow) was also affected with generalised tuberculosis, including the two anterior quarters of the mammary gland or udder.

In view of this discovery I expressed the opinion that it was more than probable that other animals in the herd were affected with tuberculosis. I therefore recommended that the milk of every cow should be subjected daily to the process of sterilisation, until such time as the herd could be tested with tuberculin, when all animals that gave a reaction should be eliminated and destroyed.

Mr. Bowden informed me that about twelve months ago one or two unthrifty-looking cows were killed, and when they were opened the same lesions of disease—namely, tuberculosis—were manifest. In consequence of these facts, and by somewhat extensive experiments with tuberculin under many varied conditions, every application proving more and more its practical infallibleness and marvellous significance, I recently suggested to the Comptroller-General of Prisons (Captain Pennefather) the urgent necessity of having the entire herd subjected to the tuberculin test. To this Captain Pennefather willingly consented, and, with Ministerial authority, I visited St. Helena on the 1st September last, and tested with tuberculin the entire herd of sixty-eight animals, completing the work by the 7th September.

NOTES ON THE GENERAL MANAGEMENT OF THE HERD.

The various grass paddocks in which the cattle run are scarcely more than 100 acres in extent; consequently the animals receive a large amount of stall feeding, the food principally consisting of fresh-cut Kafir-corn, chaffed green and dry lucerne, sweet potatoes, and an assortment of rye and oaten grass, &c.—in fact, all rich, nourishing cultivation fodder.

In one of the smaller paddocks there is a splendid long shed, open on one side, with thirty well-designed roomy stalls, perfect drainage, and means for easily getting rid of manure.

In an adjoining paddock there is ample accommodation in the way of stalls, sheds, good yards, &c., for housing at least another forty animals; and considering that there is an ample supply of cheap labour (the cleaning, feeding, and milking operations all being carried out by the prisoners), the animals are specially well cared for. The cows are milked very regularly—viz., commencing punctually at 5 o'clock in the morning, and 2 o'clock in the afternoon; feeding is also conducted at regular hours.

During my visit, there was not one sickly-looking animal in the whole herd, every beast, with the exception of a few of the very young calves, looking in the pink of condition, and, as far as the disease tuberculosis was concerned, every animal would have passed a general physical examination; and yet when the tuberculin test was applied, it readily detected the presence of this dread disease in seven of the prime cows, which in truth might be regarded, from their breeding, milking qualities, and general appearance, as the pick of the herd.

NOTES ON THE RESULTS OF THE TUBERCULIN TEST.

It will be seen from the tables of temperatures that, of the entire herd of sixty-eight animals, 7 or just over 10 per cent. were found tuberculous, which if we take only the thirty-three milking cows is about 21 per cent.; yet when compared with the testing of valuable pedigree herds kept under similar conditions in other countries, the percentage of tubercular animals is not very great. Of the seven tuberculous animals, five were pure-bred Ayrshires, one milking Shorthorn, and one pure-bred Illawarra. Two of the Ayrshires—viz., Annie and Snowdrop—being heavy in calf, were only giving a few pints of milk each day, the milk being boiled, and afterwards given to the pigs. The remaining five, which were much more advanced in pregnancy, had been dried off a good many weeks previously.

The free use of tuberculin and the results obtained in various countries are every day proving that tuberculosis in cattle is rarely found to be hereditary, for it has been proven beyond dispute that calves of diseased cows are in 99 per cent. of cases healthy when born, and do not inherit the disease. If they are removed at once and fed on healthy milk and prevented from living with the diseased mother, thereby prevented from becoming infected by inhaling or ingesting the disease germs, they will grow up to be healthy cattle. This system, first introduced by Professor Bang, of Copenhagen, of raising healthy calves from diseased parents, has long been adopted with great success in different continental countries, more especially Denmark.

In consideration of these facts, and knowing full well how dairy farmers in this colony like to see confirmatory evidence brought forward as a result of local observations, I arranged that all the seven cows (which were in calf), unless exhibiting any outward dangerous symptoms of tuberculosis, should be completely isolated in a separate paddock from the rest of the herd, and kept until they had calved, when the young calves would be immediately removed to another part of the island and the mothers killed. On the morning before leaving the island I made a careful inspection of the seven isolated tubercular animals. One cow, a fine vigorous-looking animal, was noticed to be salivating somewhat freely, and thick mucous running from the nose, which, on microscopical examination, was found to contain an abundance of tubercle bacilli, whereupon it was decided without any hesitation to have this animal killed. On *post-mortem* examination, it was ascertained that there were several large tubercular nodules deeply seated in the dorsal parts of both lungs, while one large caseating patch was ulcerating into one of the bronchial tubes. There were no tubercles discernible on the outer surface of the lungs, nor on the lining of the ribs and diaphragm. The bronchial, pharyngeal, and mediastinal glands were all more or less affected, while the mesenteric lymphatic glands were distinctly caseous. The liver, spleen, kidneys, and mammary glands were apparently healthy. Mr. Bowden has kindly promised to make careful daily observations on the remaining six cows, and inform me immediately any serious symptoms are manifest.

It has been pointed out by persons who have little faith in the tuberculin test that the application of the test to healthy milch cows very materially affects their milk for several days after the tuberculin is injected. On the present occasion careful records of the weights of milk from each of the twenty milking cows were kept night and morning for three days before, during, and

three days after the test. (*See Appendix D.*) It will be noticed that there is scarcely any appreciable diminution in the quantities of milk of any one of the animals.

It would have been specially interesting to have estimated the percentage of butter fats from each cow, but unfortunately that much-needed appliance, the Babcock milk-tester, does not find a position among the dairying utensils at St. Helena. It is to be hoped, however, that it will not be long absent, for it is a well-established fact that the yield of milk is in no way proportionate to the yield of butter fats.

COLOUR IN RELATION TO DISEASE.

There is a widespread opinion among stockowners that disease, especially tuberculosis, exists to a greater extent among white or light-coloured animals than among the dark-roan, red, or black cattle. Mr. R. Thornton, of Tower Hill, who has kept very careful records for a number of years, states that from his somewhat extended experience he finds white or light-coloured cattle are more susceptible to disease than other cattle of dark colour. The results of the tuberculin test among the St. Helena cattle somewhat confirm the correctness of these statements, for five of the seven cows which were found tuberculous were obviously light-coloured animals.

NOTES ON THE BULLS.

It is particularly interesting to know that none of the seven bulls reacted to the test, also that previously no bulls have at any time shown symptoms of tuberculosis. The only reasonable explanation I can give as to the absence of this disease among the bulls is—(1) all calves are taken away from their mothers immediately after birth, and kept in yards and pens specially set aside for the purpose; (2) the bulls are never allowed to be fed in the same stalls as the cows; and (3) all cows are taken to the bull, and after being served are immediately removed, thereby reducing the risk of infection to a minimum.

DOUBTFUL REACTIONS TO THE TEST.

The two-year-old heifer Hessie and the yearling bull Young Randwick each gave a fairly high temperature the day after injecting the tuberculin. In Hessie's case it was ascertained that she had received an injury to the right shoulder from the horn of another animal on the night previous, causing her to remain feverish all the following day; while Young Randwick had received a superabundance of fresh green feed, which would be an almost certain factor in raising an animal's temperature. However, until both of these animals are tested again under more favourable circumstances they will be considered as doubtful cases.

Several of the very young calves after injection gave fluctuating high temperatures, but this was caused more or less by excitement.

LIST OF HEALTHY COWS AND HEIFERS FROM DISEASED (TUBERCULAR) MOTHERS.

Healthy.					Age.	Tubercular.					Age.
Ladybird	...	...	...	...	3	Out of	Snowdrop...	...	...	...	6
Jenny	...	...	...	...	1	"	"	...	...	...	6
Fanny	...	...	...	...	2	"	Diana	...	...	...	7
Grace...	...	...	...	...	6	"	Annie	...	...	...	9
Dinah IV.	...	...	...	...	1	"	Dinah	...	...	...	9
Louisa	...	...	...	...	1	"	Maggie II....	...	...	...	13
Goldspray	...	...	...	...	5	"	Cassandria...	...	...	...	Dead

The cow *Cassandria* is one of those previously referred to as having died three years ago from blackleg, and on *post-mortem* was found to be affected with generalised tuberculosis.

The yearling heifer *Jet*, which gave no reaction to the tuberculin test, is a daughter of *Goldspray*.

The following table, showing the number of calves and the milk obtained from each cow affected with tuberculosis, may be of interest to dairy farmers:—

Name of Cow.								Milk Yield.			Number of Calves.
Maggie II.	...	...	...	...	...	...	...	Very large	...	...	7
Annie	...	...	...	...	...	...	...	"	...	...	6
Dinah	...	...	...	...	...	...	...	"	...	...	5
Diana	...	...	...	...	...	...	...	"	...	...	5
Bluebell	...	...	...	...	...	...	...	"	...	...	5
Floss	...	...	...	...	...	...	...	Average	...	...	5
Snowdrop	...	...	...	...	...	...	...	"	...	...	3

The only instance of very close relationship in regard to the disease tuberculosis is that of *Floss* and *Snowdrop*—mother and daughter respectively. In this particular case it is highly probable that they both contracted the disease from some common source, or one did, which afterwards became the source of infection for the other; for it may be mentioned that these two animals have been constant companions for the last four years, always living, feeding, and drinking together, and wherever possible keeping together in adjoining stalls during the milking operations.

RECOMMENDATIONS.

1. Under the present system at *St. Helena*, the cows are allowed to go into any stall they please. This is a very grave error, for it is of the utmost importance that cattle should be taught to always go into their own respective stalls which are specially allotted to them; by so doing, should any one of the present healthy animals become infected with tuberculosis, the infection will to a very great extent be restricted to the animal in its own particular stall.
2. Cattle, as far as possible, should be prevented from licking one another, and from eating out of none other than their own particular manger.
3. All suspected animals should be isolated, and should neither eat nor drink out of a common manger or drinking trough; nor should any feed they leave be given to other cattle. Old cows, and those having a husky cough, wheezy breathing, nasal discharge, enlarged glands under the skin, diseased udder or joints, unthriftiness in general, narrow chest, light barrel, long legs, pot bellies, &c., are most open to suspicion, and should be tested without delay by means of tuberculin.
4. No new animals, whether bulls, cows, or calves, should be admitted, even if from the most unsuspected herds, unless they have just been examined and tested with tuberculin, and passed by an officer who has been instructed by this Institute.
5. Rigid official inspection and application of the tuberculin test on every animal in the herd should be carried out at least every six months.
6. All calves should be reared on milk of guaranteed healthy cows; otherwise if the cows from which the milk is obtained are in the slightest degree suspected the milk should be scalded. The national system in *Denmark* is to feed all dairy calves on sterilised milk, so as to remove all possible risk of inducing the disease by ingestion.
7. Considering that the highest authorities on tuberculosis are of opinion that curative treatment is of little or no avail whatever, it remains that the very strictest measures be taken to prevent its spread to the remaining healthy animals; for we must regard the stalls which have been used for the infected animals as contaminated with tubercular material.

8. Careful disinfection, under supervision, of all the stalls and mangers and sheds used as cattle shelters. The best disinfectant for woodwork is one in 1,000 watery solution of bichloride of mercury. It should be prepared and kept in an earthenware vessel, and applied hot with a small woollen mop. Every part of the woodwork of the interior should be thoroughly washed, especially the wooden partitions, mangers, hay-racks, &c. After an interval of a few days, the disinfecting process should be repeated, and then whitewash all the inside of the buildings. The whitewash should not be made too thick, and should contain 1 lb. of chloride of lime to every five gallons of water.

9. No consumptive person should be allowed to work amongst the cattle or prepare their food.

CONCLUSIONS.

In my opinion it is extremely injudicious to breed from very young or very old cows, or too frequently from the same animal, more especially if in the latter case the animal is a heavy milk-yielder. The nourishment which should restore the maternal vigour is diverted to the development of the foetal calf and to the making of milk. If used for breeding too young, the mother's growth is stunted, and the offspring is apt to be weak and puny; if bred too late, the constitution suffers from the strain. All such animals are probably more susceptible than if bred with more care.

A most important fact worthy of the most crucial consideration by every dairy farmer is that the modern dairy cow is a highly artificial animal. She can only be compared to a machine for the conversion of raw material—fodder—into the finished product—milk. A skilful and intelligent engineer only works his machine to the full extent of safe production; and why should not the dairy cow be similarly handled, and an undiminished strength of constitution made the measure of her production? During my travels in the various districts of Queensland, I occasionally come across the better types of modern dairy cow, which are striking examples of ability, energy, and intelligence on lines of breeding, feeding, and milk yield, and which are by no means to be abandoned; but I specially argue for a due regard for the danger which attends high production, for healthy surroundings and vigorous ancestry, and last, but not least, for a watchful and intelligent care to weed out and keep out disease.

From many years' close scientific observation, I feel confident in saying that the valuable qualities of our dairy cows may thus be preserved and transmitted, uncontaminated, to future generations. In order to accomplish all this, it will be absolutely necessary to make periodical, systematic, and careful applications of the tuberculin test.

Brief Description on the Use of Tuberculin.

The injection of tuberculin in recognised standard quantities is always innocuous; performed on milking cows, it in no way affects either the quantity or quality of the milk produced, and it in no way interferes with gestation, even in animals about to calve. The usual practice in applying tuberculin as a means of diagnosing tuberculosis in cattle is, first of all, to determine the normal temperature of the animal, which is done by the use of the clinical thermometer. For ordinary purposes, tuberculin is employed diluted to the extent of one-tenth in carbolic water—5 per 1,000. The best plan is to inject at one time beneath the skin behind the shoulder 3 to 4 cubic centimetres of the dilution (3 cubic centimetres for cows of medium size, $3\frac{1}{2}$ for large cows, and 4 for bulls and high-class animals). The temperature of the animal must be taken before the injection, which, in general practice, it is usually desirable to make about 6 p.m. The temperature of the suspected animal is taken next morning at 6 o'clock, then at 9 a.m., 12 noon, 3 p.m., and the last one at 6 p.m. The diagnostic reaction is measured by the difference between the initial normal temperature, which is about 101.5 degrees Fahr., and the

highest temperature recorded after injection. If this difference exceeds 1·5 degrees Cent., equal to 2·7 degrees Fahr., it may be affirmed that the animal is tuberculous. It may happen that the animal at the time of the proposed injection is feverish. This is caused often enough by hot weather, excitement, or by some passing irregularity of the digestive functions, and other physiological changes. It is better in such cases to defer the operation. It is important also to remember that in very tuberculous animals, those especially which are phthisical in the proper sense of the word, the injection of tuberculin may produce no rise of temperature whatsoever; but there is no difficulty in these cases, as the clinical diagnosis is always very easy.

ST. HELENA, 2ND SEPTEMBER, 1898.

Milking Cows Tested with Tuberculin.

Name.	Colour.	Breed.	Age.	Before Injection.		After Injection.				
				2 p.m.	6 p.m.	6 a.m.	9 a.m.	12 n.	3 p.m.	6 p.m.
Polly	B. and W.	Ayr.	3 yrs.	102·6	102·4	101·5	101·9	101·9	102·4	103·
Ruby	Red	"	4 "	102·	102·	101·	101·6	101·4	101·8	102·
Robina	D. R.	Illaw.	7 "	102·9	102·9	101·6	101·6	101·9	102·2	101·
Grace	R. and W.	Ayr.	6 "	102·1	101·9	101·3	100·8	101·2	101·7	101·5
Duchess Pride ...	W. and R.	"	9 "	101·8	102·8	101·7	101·6	101·8	102·3	102·2
Lady Violet ...	W. R. Sp.	"	6 "	102·2	102·2	101·9	101·9	101·8	102·5	102·9
Lily	Red	"	6 "	102·8	102·2	101·9	101·3	101·8	101·5	102·2
Gold Spray ...	Red, R. N.	Illaw.	5 "	102·2	102·4	101·8	101·7	101·8	102·7	102·6
Nellie	R. and W.	Ayr.	4 "	101·7	102·2	101·6	101·3	101·4	101·5	102·2
Bella	W. and R.	"	3 "	102·6	102·8	101·8	102·1	101·9	102·5	102·2
Annie	W. and R.	"	9 "	101·9	101·8	104·4	105·9	105·	105·1	104·9
Primrose	R. and W.	"	10 "	102·3	102·1	101·4	100·9	101·3	102·	102·2
Lady Tempest ...	R. and W.	Illaw.	5 "	102·	102·5	101·2	101·7	101·2	102·1	101·7
Snowdrop	W. and R. face	Ayr.	6 "	102·1	102·	105·9	106·4	105·4	103·5	102·6
Olive	W. and R.	"	3 "	103·3	103·	102·1	102·1	102·2	102·8	102·8
Violet Pride ...	R. and W.	"	9 "	102·	102·1	101·4	101·6	102·1	103·5	103·8
Lotty	R. and W.	"	4 "	102·2	102·	101·6	101·7	101·9	101·4	102·
Edith Pride ...	R. and W.	"	6 "	102·4	102·6	101·8	101·6	102·3	102·8	103·
Flora	W. and R.	"	10 "	102·1	102·4	102·	101·7	101·7	102·4	102·4
Dewdrop	D.	"	4 "	101·1	101·6	101·6	101·8	102·1	101·7	101·8
Lady May II. ...	W. and Y.	"	10 "	102·8	102·1	101·4	101·2	102·1	102·1	102·
Lady Bird	R. and W.	"	3 "	102·1	102·5	101·4	101·8	102·3	102·9	102·5

Dry Cows Tested with Tuberculin.

Floss	W. and R.	Ayr.	9 yrs.	101·4	104·1	105·4	106·3	106·2	106·4	106·
Countess	R. and W.	"	9 "	102·5	104·	103·8	102·8	103·1	102·9	103·1
Dinah	D.R. and W.	"	9 "	102·6	102·6	103·5	104·2	104·7	106·5	105·3
Blue Bell	Y.R. and W.	"	9 "	102·9	102·2	105·8	105·4	105·4	105·6	105·3
Maggie II.	Red	S'horn	13 "	102·7	103·1	105·4	106·3	105·2	104·2	103·2
Lady Fancy	Y. and W.	Ayr.	10 "	102·5	103·	101·4	101·	101·2	101·7	102·1
Dora	White	Illaw.	7 "	102·6	104·8	101·4	101·1	102·2	101·4	102·5
Helaine	Roan	"	7 "	102·	103·6	103·7	105·2	104·2	103·1	103·
Queeny	Blue Roan	S'horn	5 "	102·3	101·9	101·2	101·1	101·5	101·7	104·1
Victoria	W. and R.	Ayr.	20 "	101·7	102·3	101·2	101·3	101·6	101·9	102·5
Diana	L. and R.	Illaw.	7 "	102·	103·6	103·7	105·2	104·5	103·1	103·

Heifers Two Years Old.

My Girl	R. and W.	Ayr.	2 yrs.	101·8	101·8	101·2	101·6	102·1	101·2	102·1
Hessie	Red	Illaw.	...	...	102·5	105·1	105·1	105·1	104·	103·6
Criss	Red S.	S'horn	...	...	102·1	101·1	101·1	101·1	101·2	102·1
Coral	Red	"	...	...	102·2	102·	101·1	101·1	101·7	101·8
Fannie	Red	"	...	...	101·9	101·4	102·1	101·7	101·7	102·4
May Queen	W. and R.	Ayr.	...	...	102·8	102·3	101·2	101·9	103·1	101·9
Lady Lough	Roan	"	...	...	102·5	102·1	102·1	102·4	102·8	101·7

Bulls.

Lionel	D.R. and W.	Ayr.	4 yrs.	...	101·7	101·1	101·9	101·1	101·8	101·7
Young Randwick ...	W. and R. hd.	"	...	...	101·8	104·3	103·9	103·8	103·6	103·1
Young Dunlop ...	Dark R.	"	...	...	102·	105·5	103·1	103·	103·1	102·3
Monarch	W. and Spts.	"	...	...	103·1	103·9	102·1	102·5	103·6	102·1
Northern Chief ...	R. and W.	"	...	...	104·	102·	102·9	102·1	103·6	102·8
Lord Loran	R. and W.	"	...	...	104·	102·	102·2	102·7	103·7	102·1

Yearling Heifers Tested with Tuberculin.

Name.	Colour.	Breed.	Age.	Before Injection.		After Injection.					
				2 p.m.	6 p.m.	6 a.m.	9 a.m.	12 n.	3 p.m.	6 p.m.	
Princess	R. and W.	Ayr.	Yearlings.	...	102·4	101·4	101·7	102·1	102·	101·9	
Kate	R. and W.	„		...	101·8	101·	101·5	102·3	102·5	102·1	
Louisa	W. and R.	„		...	101·8	101·6	102·3	101·8	101·8	102·1	
Lady May III. ...	W. and R.	„		...	102·1	101·4	101·2	102·1	101·6	102·	
Jet	Red	„		106·3	102·7	101·9	101·8	101·8	102·4	102·7	
Dianah IV.	D. R. and W.	Illaw.		104·6	102·	103·6	102·9	102·1	102·5	103·6	
Young Primrose	D. R. and W.	Ayr.		104·3	103·9	102·	101·9	102·2	102·5	102·4	
Winsome	D. R. and W.	„		103·3	102·6	102·1	102·6	102·3	102·	102·1	
Gipsy	Strawberry	Ill. & A.		105·4	103·4	102·3	102·1	102·1	102·4	103·	
Amy	Spotted	Ayr.		104·5	102·9	102·1	101·8	102·2	102·2	102·	
Lady	Spotted	„		104·5	103·1	102·3	102·8	102·1	102·1	103·	
Stumpy	Spotted	„		106·2	102·9	102·5	101·2	102·2	102·6	102·3	
Sprightly	Y. S.	„		104·9	102·	102·8	102·1	102·4	102·2	102·4	
Lady Tozer	S. R.	„		105·9	103·	102·4	102·8	103·	102·7	104·1	
Beatrice	Red	„		...	101·7	101·1	101·2	102·5	103·3	101·5	

Calves under Six Months.

Rosebud	D. R.	Ayr.	101·1	102·8	102·4	101·7	102·8	102·4	102·4
Jenny	W. and R.	„	102·	102·9	101·7	101·6	103·6	101·6	103·2
Maud	W. and R.	„	101·8	103·	101·5	101·1	102·4	103·1	102·1
Laura	W. and R.	„	102·1	102·3	101·2	101·3	102·1	101·2	102·3
Lena	W. and R.	„	103·1	102·6	101·6	102·5	103·2	102·7	102·5
Lavina	W. and R.	„	101·8	102·1	102·	103·1	102·5	103·1	102·3

APPENDIX D.

Morning and Evening Returns of Milk from Non-Tuberculous Cows taken Three Days before Day of Application, and Three Days after the Tuberculin Test was applied.

Name.	August.						September.							
	29th.		30th.		31st.		1st.		2nd.		3rd.		4th.	
	M.	E.	M.	E.	M.	E.	M.	E.	M.	E.	M.	E.	M.	E.
	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.
Ruby ...	5	3	5	3	6	2	5	3	5	3	5	5	3	3
Snowdrop ...	6	3	6	3	5	4	5	4	5	4	4	3	Turned out	
Primrose ...	4	2	4	2	5	2	5	2	4	3	4	2		5
Lady Bird ...	6	2	6	2	6	2	6	3	5	3	5	3	6	3
Polly ...	6	2	6	2	6	3	6	3	6	3	6	3	6	3
Dewdrop ...	7	3	7	3	7	3	7	4	7	3	7	3	7	3
Violet...	5	3	5	3	5	3	6	3	5	2	4	2	6	3
Robina ...	4	2	4	2	3	2	4	2	4	2	3	1	4	2
Lily ..	7	3	7	2	6	3	7	3	7	3	6	4	7	3
Lady Tempest	2	1	1	1	1	1	Turned out.							
Lottie...	6	3	6	3	6	3	6	3	6	3	6	3	6	3
Grace ...	7	4	7	4	6	3	6	4	6	4	5	3	6	4
Duchess ...	11	7	11	7	11	7	11	7	12	7	12	6	12	7
Gold Spray ...	15	8	13	8	14	7	14	6	13	8	13	6	13	7
Nellie...	12	10	13	10	12	10	15	8	13	9	14	8	15	8
Bella ...	15	9	15	9	14	10	15	8	14	11	15	10	10	9
Flora ...	15	7	15	7	15	7	14	7	14	8	14	7	14	7
Edith ...	20	10	20	11	19	10	18	12	18	11	18	11	21	10
Olive ...	15	8	14	8	15	8	14	9	14	8	13	8	14	8

General Notes

SNAKE BITES.

By A. J. BOYD.

WITH the advent of the hot season, those undesirable reptiles, snakes of various kinds, are making their annual appearance, and it therefore behoves all country dwellers to gain some knowledge of their habits and peculiarities. Many people have subjected themselves to painful operations, and to the no less objectionable cure of ardent spirits, ammonia, &c., under the belief that they have been bitten by a venomous snake, when calm examination would have shown that the bite had been inflicted by a harmless species. An incident which happened to ourselves many years ago may illustrate this point. Returning from town to Oxley Creek one evening at a time when the only track was that cut by a surveyor through the dense scrub, which then (1862) bordered the Brisbane River and its tributary creeks, we suddenly trod on a snake which at once inflicted a wound in the leg. We worked hard at that wound with a knife, blunted by constant use in tobacco-cutting, and then travelled over a mile to our home. On arrival, the wound was examined, the knife having failed to make any impression, and it was seen that there were a great many tooth-marks on the flesh. Having read Dr. Krefft's work on Australian snakes, we felt assured that the reptile was non-venomous, and the result proved this to be correct, as no evil effects followed. Dr. Krefft says

that the bite of a non-venomous snake shows tooth-marks thus— whereas venomous snakes leave only two punctures, thus— or possibly three or four, thus—

The venomous snake does not *bite*. He *strikes* and immediately withdraws. A carpet snake, for instance, when biting, hangs on, and even shakes his victim, as happened in the case above mentioned, whilst a brown snake, of whose attack we also have some experience, only inflicts a wound in the shape of a blow. Many people are afraid of water snakes. The true *fresh* water snake, ugly though he appears, is quite harmless, whilst the sea snakes are all poisonous. There is, of course, some difficulty in deciding, when meeting a snake swimming in fresh water, whether it is a true water snake or merely a land snake taking a bath or crossing a creek or lagoon. All marine water snakes exhibit a tail formation different to that of land snakes, and can be at once determined. Few of the tree snakes are venomous. Indeed, the number of venomous snakes in Queensland is small in comparison to the number of varieties. There is a simple means of deciding whether a snake is venomous or not, and that is by the labial scales. In the dangerous species, the number of scales on the lip is eight, whilst more than eight are seen in non-venomous snakes, such as the carpet snake, green snake. Even the most deadly species are not so dangerous as those of India, and of Southern and Central America, or as the rattlesnake of North America, the venom fangs of the former being shorter than those of the latter.

People talk of snakes *stinging*. Snakes never sting, Nature not having provided them with any apparatus for the purpose. The *sting*, so-called by uneducated people, is the tongue. This member is forked, and serves the same purpose as the antennæ of a cockroach or butterfly. It receives the vibrations of the air, and it serves to warn the snake of the presence of a possible enemy. The sole weapon of offence in a venomous snake is the fang, which is movable. It is not, as many suppose, hollow or perforated from root to tip, but is grooved. The base of the fang rests on a poison gland. When not in use for aggressive purposes it lies flat on the gum, and is only erected when the reptile is excited

and on his defence. The instant the blow is made, the poison bag is compressed, and the venom runs down the channel in the fang into the wound. A thick woollen stocking will often prevent serious effects by absorbing the poison as it passes down the channel. Many of the innocuous snakes destroy their enemies or kill their prey by means of constriction. The constrictive powers of snakes of the boa and python species are enormous. A 10-foot long carpet snake has power to crush the life out of a human being. Such a snake seized by the neck and tail simultaneously is rendered harmless, as the tail is said to be requisite for aiding the constrictive operations. All Australian land snakes, except the death (or deaf) adder, are good climbers. A black snake will climb the smooth surface of a gum-tree with ease. When an attempt is made to draw a large snake from a hollow log by the tail, the attempt is almost sure to fail, as the snake opens its scales and so offers strong resistance to its would-be captors.

The death adder has, near the end of the tail, a peculiar hooked appendage, of which scientific men have not yet been able to decide the use. It is too soft to enable it to penetrate anything. It is not hollow, and contains no poison. Its functions are as much a mystery as the curl in the tuft of a lion's tail. When bitten by a snake the victim should, if possible, keep calm and kill the reptile. On examination it will often be found that there is no cause for alarm, and hence no need for violent remedies.

Should, however, the snake prove to be venomous, a ligature of a strip of linen, of greenhide or cord, should be at once applied above the wound, which should be scarified with a knife, to cause profuse bleeding. If no other remedy is at hand, the person bitten should keep in motion and resist all inclination to lie down. Spirits—either alcohol or ammonia—should be freely administered, if procurable. The bite of a black, brown, or even diamond or tiger snake is not necessarily fatal, much depending upon the clothing worn by the victim at the time, and upon the direction and locality of the bite.

The bite of the death adder is, however, said to be usually attended with fatal consequences.

Carpet snakes, although harmless to human beings, who often make pets of them, are a source of great trouble to poultry-keepers. They often attack the fowl-roosts at night, and destroy eggs, chickens, and grown fowls. They are, on the other hand, excellent ratters, and thus are useful in the barn. They are far superior to cats in this way, as they can follow the rats to their hidden nests, and they do not assemble on the roof at midnight and loudly proclaim their connubial bliss to the sleeping world. They are not in the least a source of danger in the house. The writer once slept all night in a small room 6 feet broad by 8 feet long in company with a large carpet snake. On entering the room a peculiar smell was observed, and this led to a search for a snake. There is a distinct odour exhaled from the breath or else exuded from the body of a snake, which, in a confined space, betrays its presence. On the occasion now mentioned, this odour, being recognised, led to a search which was fruitless, and it was concluded that if a snake had been in the room he had been warned that it would be healthier for him to seek outside quarters. Next morning, however, there was his snakeship comfortably coiled up on a heap of bags in one corner. The only wonder is that it did not seek the warmth of the blanket during the night. The reptile was about 7 feet long and nearly 9 inches in circumference. It now is located in a large glass case in the hall of a house in London—stuffed, of course.

There is a lamentable amount of ignorance of snakes and their habits, even amongst old bushmen, timber-getters, fishermen, &c., and ludicrous beliefs exist in consequence regarding the methods of attack adopted by the reptiles. Here is one. There is on the South Coast lands of Queensland a ringed snake, the marks on its body being alternate black and white rings. Under the name of "hoop snake," this animal is supposed to take its horny pointed tail in its mouth, and start for its enemy or for its prey in the form of a boy's hoop or a bicycle wheel. On arriving within striking distance, it lets go the tail, straightens itself

out, and flies *tail first* at the enemy, inflicting a mortal sting. We were solemnly informed by one man that he had seen the snake miss his game and strike a gum-tree. The tail penetrated the thick bark, and there the snake would have had to remain till it starved to death had not our informant killed it! As a matter of fact, this snake is perfectly harmless, not even attempting to bite when handled.

In this connection we shall be glad to receive an account of any *authenticated* adventures with Australian snakes, for publication elsewhere than in Queensland.

To show how much education in this respect is needed, the present Comptroller of Prisons, Captain Pennefather, was bitten at Sweer's Island, in the Gulf of Carpentaria, by a snake which was reputed to be deadly. He, however, understanding the difference between the venomous and innocuous varieties, took no heed of the bite, and no evil effects followed.

On the other hand, we have seen a kind of large black snake from the Bellenden-Ker Mountain, which was said to have killed a member of an exploring party. The man died, but the snake, when brought to Brisbane, was proved to be perfectly harmless. Fear and spirits wrought the evil in this case. The moral is: Examine the wound, examine the labial scales of the snake if it has been killed, and it will often be found that no remedies are required beyond perhaps a glass of spirits, to keep up the spirits and allay the unfounded fear of the wounded person.

A HINT TO STRAWBERRY-GROWERS AND GARDENERS.

MR. H. C. QUODLING, Manager of Westbrook Experiment Farm, writes:—Numbers of valuable plants succumb every year after transplanting to the effects of sun and wind, even if there is sufficient moisture in the soil. Artificial cap-shades which necessitate labour in making them become expensive. To meet this want of a cheap and effective shade, I strongly advise those interested in the above occupations to grow a number of the bottle or ornamental gourds (*Lagenaria vulgaris*), which, when mature and dry, can be sawn in two and used for shading young plants.

QUEENSLAND FRUIT AND WHEAT LANDS.

IN the course of a very interesting paper on Queensland, read before the Forest Range Branch of the Central Agricultural Bureau of South Australia, Mr. J. Caldwell remarked that he was most favourably impressed with what he had seen of agriculture in Queensland, but he considered that the temperate fruits which grew to such perfection in South Australia would never be grown on a large scale in that colony. In regard to wheat-growing he said that, although there were large areas of land in Queensland suitable as far as soil and position went, the fact that much of it was *liable to flooding* and that heavy rains often come in November, causing heavy damage by rust, would, he considered, make it impossible for Queensland ever to become a very large producer of wheat.

We are from this statement led to conclude that Mr. Caldwell had the coast lands east of the Main Range in his eye. The wheat lands of the Darling Downs and of the Central districts are not subject to floods at any time, and the fact that Queensland's average production of 17 bushels per acre is not an unusual occurrence should point to the fact that the colony is eminently suited to wheat culture, occasional visitations of rust notwithstanding. Last year we produced 1,000,000 bushels, and this year the outlook is most hopeful for a record crop. East of the Range prospects are not so hopeful. Rust has appeared, but no floods have occurred to do any damage since 1893. As to the fruits of temperate climates, the whole of the Downs country, and especially the Stanthorpe district, is eminently suited to their production on a large scale.

THE WORLD'S SUPPLY OF WHEAT.

RETURNS obtained by "Beerbohm" make the world's visible supply of wheat on 1st August only 7,088,000 quarters, or about 400,000 less than the exceptionally small total of last year at the corresponding date. During the five preceding years the total on 1st August ranged from 12,500,000 to nearly 19,750,000 quarters. Still, as estimates of the new crop are exuberant, in spite of disappointing yields in France and the United States, prices are on the down grade, and English wheat has been sold as low as £1 12s. a quarter in London, while Indian wheat has been disposed of at £1 9s. 6d. in some cases. Wet weather might cause a temporary recovery, if sufficiently prolonged to injure the crops in this and other countries; otherwise, the markets will soon be glutted, with the usual result.—*Standard*.

BUDD'S EARLY WHEAT.

THE Tambourine Mountain would appear to suit this particular wheat when planted early, at all events, under some climatic conditions. Mr. W. A. Davidson writes that he sowed some of this wheat, which he received from the Agricultural Department on the 23rd April last. The plants in September were upwards of 5 feet in height, and the ear measured $6\frac{3}{4}$ inches. There was no sign of rust.

WHEAT IN VICTORIA.

ENCOURAGING reports concerning the coming wheat harvest in Victoria have reached us. It would appear that, notwithstanding rust in some parts, drought in others, and floods elsewhere, the harvest of 1898 will, throughout the colonies, be a record one. In Victoria, where wheat-growing has generally rivalled the industry in South Australia, there are over 1,600,000 acres under wheat. Averaging the yield at 10 bushels per acre, the harvest should not only be sufficient for local requirements, but leave 9,000,000 bushels for export. With a fair average yield in the other colonies, the surplus will have to be sent to countries beyond the seas, and then will come the question of price, which will naturally be ruled by prices obtained in those markets.

A TREE-PRUNING DEVICE.

To horticulturists and arboriculturists who desire to have their trees, shrubs, or hedges cut to a uniform or particular shape, the following described instrument (says the *Australasian*) will be found useful, and is termed a "dendroscope":—The tree requiring pruning should be carefully studied from the ground, so that the operator may be able to judge intelligently which branches should be removed or shortened in order to reduce it to the desired shape. This at first may seem difficult to beginners in the art of pruning; and a dendroscope is the name suggested for a simple little contrivance, which may be here used with advantage. A dendroscope may be made from a piece of thin board or cardboard—an ordinary playing-card answers the purpose—in



which a hole the shape it is desired to reduce the tree to has been cut; across the middle of the hole, from the top to the bottom, a piece of wire is stretched to serve as a guide to the eye. Holding the card at the level of the eye, with the wire opposite the centre of the trunk of the tree to be studied, the operator approaches the tree until the bottom of the cut falls on the trunk at the ground line. It is easy to see at a glance with the aid of this contrivance what operations should be performed in order to reduce the tree to the desired shape. Under ordinary circumstances a vigorous, handsome tree must have a straight, vertical trunk and evenly balanced head, and the first object should be to produce these conditions. By placing the instrument on a stick the required height, and placing it in an upright position, the pruner can move to and from the tree without an assistant to help him in the work.

BEET SUGAR FACTORIES.

ONE of the most hopeful circumstances of Californian agriculture is said to be the rapid development of beet-growing for sugar production. Four sugar factories, capable of dealing with 2,950 tons of beets daily, were in operation last year in that State, and three more, with a capacity of 6,000 tons per day, will be opened this season. Growers get 16s. to 17s. per short ton (2,000 lb.) for the roots, which is a very good price in comparison with the prices of other kinds of farm produce in California; and the manufacturers calculate upon a considerable profit if they make even 2d. per lb. for the sugar, while fine granulated sugar is worth fully a halfpenny more.—*Standard*.

A NEW USE FOR MAIZE.

THE *Scientific American* has received a sample of a rubber substitute made from corn. It is made from the oil derived from corn; and by vulcanising it in connection with an equal quantity of crude indiarubber, a substitute is produced which, for certain purposes, is equal to the best gum rubber at a greatly lessened cost. The new corn rubber is claimed to possess all the essential qualities of Para rubber, including resiliency, and the discovery has been hailed with delight in the corn-growing States of the West. The manufacturers claim that the fact that corn oil does not oxidise readily makes this product of great value, since it is not affected by oxidation, so that products manufactured from it will always remain pliable, and not crack as those made from other substitutes. This interesting substitute for rubber is very dark-brown or black, and it easily rubs off in light-brown rolls. It is at present sold as low as 6 cents per lb.—*Exchange*.

TO PREVENT BIRDS EATING FRUIT.

ANYONE who has observed the habits of fructivorous birds will have noticed how fond they are of mulberries. The Brisbane sparrow will leave all other fruit to indulge in a mulberry feast. Now, this might suggest the idea of planting mulberry-trees in different parts of an orchard. The birds would take first to the mulberries, and having surfeited themselves on these would not take the trouble to attack any other fruit. There is another point to be gained by this proceeding. Many birds, although fruit-eaters, are also, to a great extent, insectivorous. The maligned sparrow, and many of the honey-eaters, leather-heads, minah birds, &c., delight in an occasional fresh-meat diet, as may easily be verified by those who take the trouble to watch them. Now, instead of slaughtering birds, which are our real friends if they do take toll of a little fruit, why not provide them with what little they want, and preserve them to assist the true insect-eaters in combating our insect pests. The senseless destruction of small birds is disastrous to the fruit industry. What can be said of men who, to get into practice for quail-shooting, systematically shoot down any and every small bird they come across, and call it "splendid practice?"

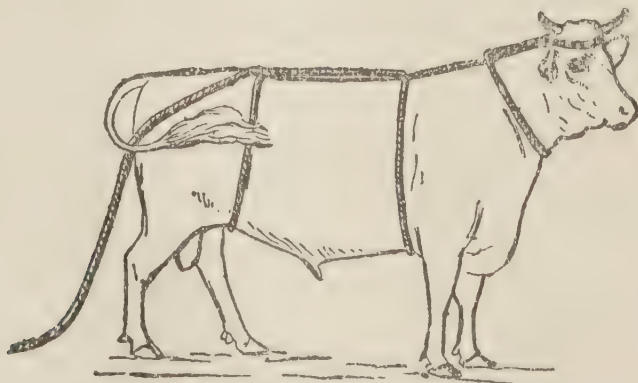
HILLING UP CORN.

OPINIONS differ on the subject of hilling up a maize crop. But it must be obvious that, under certain conditions of locality and aspect, hilling up is not only advantageous to the growth of the plant, but is an absolute necessity if a good crop is to be harvested. When corn is grown on new scrub land, hilling up is an impossibility, owing to the quantity of roots which interlace the soil in all directions. All that can be done here is to keep down the weeds. As the surrounding scrub forms a shelter from heavy gales of wind, the corn is not so liable to be blown over as it is when growing on exposed plains. The soil, again, being very loose and of marvellous fertility, repeated or any cultivation is rendered unnecessary. But the case is different where maize is planted on open downs country. There, there is nothing to impede the sweep of the winds, and deep and frequent cultivation are necessary to enable the plant to root deeply and firmly, and, by hilling up, the staying roots, which spread out like the spokes of a wheel sometimes in double tier, are thus enabled to take hold of the soil and perform the same office for the plants as do the shrouds of a ship for the masts. When growing maize is blown down, it naturally attempts to recover itself, and it does this not by rising again to a perpendicular position, but by curving upwards towards the light in the same manner as sugar-cane under like circumstances. But the crop will not be as good as it would otherwise have been. It needs no prophet to tell what will happen to ripe corn when it is blown down and wet weather ensues. Every farmer has found this out to his cost, in grand cobs in which the grain has sprouted and has anchored the cob to the ground. The moral, therefore, is: Hill up corn, at all events in open country exposed to wind.

During the prevalence of very dry weather, the hilling up should be deferred until more favourable weather, as the loosening of the soil causes it to lose what little moisture it possesses to the detriment of the coming crop.

HANDLING A VICIOUS BULL.

MR. C. A. A., of Truro, N.S., inquired in *The Farmers' Advocate* how to deal with a four-year-old vicious Ayrshire bull. He prefers not to dehorn him, as it may detract from his show-ring success, and he fears his prepotency would be reduced. The following remedy, which proved of value in many cases, is given. The accompanying illustration shows the necessary tackle adjusted on the bull, so that one strong man, by drawing heavily on the rope, can quickly take a bull off his feet. It seems to overpower him, so that he will give up immediately. In fact, one Ayrshire bull, to our knowledge, is never led out in any other way, as he will fight from start to finish when taken out by the ring in his nose. The rope is put around the horns in noose fashion, brought back to just before the shoulder and given a half hitch, brought back behind the fore



legs and given another half hitch around the body, and again brought back and placed around and given a half hitch, as shown in the illustration. The thing looks simple and may appear ridiculous to some, but it will not cost much time or trouble to give it a trial.

With regard to dehorning, we would not fear it reducing his prepotency. We regard it a serious matter to have the horns on a vicious bull; in fact, much more serious than the possible loss of considerable prize money. Dehorning seldom quiets a vicious mature bull, but it renders him much more harmless than with his weapons.

DEHORNING CATTLE.

IN a recent issue of *Hoard's Dairyman*, a paragraph reads as follows:—A few experienced dairymen hold to the belief that, after generations, the practice of dehorning will be found to have been such a shock to the animals that they will decidedly degenerate. There may be something in this idea when dehorning is continued on mature animals, but such results hardly seem feasible if the animals are dehorned while calves.

That the mere shock of the act of dehorning should reverberate to several generations ahead, seems hardly probable, but experts in the art of dehorning acknowledge the fact that a bunch of nerves is severed and partly removed by the operation. That the nerve system is as highly developed in the newborn calf as in full-grown animals is a fact so well established that it needs no repetition, and there are those, and not the ignorant, who maintain that the nerve system is first in existence; that it is the real centre, by some called the "soul of the entire organism, which is only animated by these mysterious electric wires." Now, the question presents itself: Can a mutilated being beget that which it does not possess—*i.e.*, a perfect organisation; is an imperfect organism able to resist endemic or contagious influence; may not vitality be lowered by the impediment encountered in the process of circulation, which is produced by the partial removal of these mediums?

INSECT-DESTROYING LADY-BIRDS.

THE Victorian Government Entomologist has imported from Western Australia some lady-birds which are said to be great destroyers of scale and other noxious insects. Small parcels of the lady-birds have been distributed over the colony.

ABSORPTIVE POWER OF MILK.

WHILST so much is being written about tuberculosis and dangerous milk, there are yet many people who will not believe that there can be any danger to the human system arising from drinking impure milk. They say, "How is it our fathers did not die of bad milk? Tuberculosis was just as much a disease a hundred years ago as it is now." But there was one advantage they possessed—there were no experts in dairying, at least none so called; there were no thousand-and-one new fads in medical science; and where ignorance was bliss, it would, say these agnostics, have been folly to be wise.

Now, just to illustrate the aptness of milk to take up any odour in its neighbourhood: One of our dairymen left half-a-bucketful of milk for a few hours on a stand in his dairy. When he went for it, he was about to drink some, but was deterred by the peculiar smell. It was perfectly scented. Going back to the place he took it from, he found a scented pocket-handkerchief lying close to where the bucket had been. The milk had absorbed the scent from the handkerchief. It is well known to readers of the *Journal* that scents are extracted from flowers by the help of lard, which in a few hours will take all the scent contained in them. So with milk. Being of a fatty nature, it easily absorbs any scent near it. Strange to say, milk exposed to the odour of good barley ensilage is not perceptibly affected.

CURING SMALLPOX.

WE have heard of many simple cures for the various ills that flesh is heir to, but for complete simplicity the following takes the lead. It should be worth a trial. Fortunately the experience cannot be gained in Queensland:—It is said the worst case of smallpox can be effectually cured in three days simply by cream of tartar. This is the sure and never-failing remedy: One ounce of cream of tartar dissolved in a pint of boiling water, to be drunk when cold at short intervals. It can be taken at any time, and is a preventive as well as a curative. It is known to have cured thousands of cases without a failure. It never leaves a mark, never causes blindness, and always prevents tedious lingering.

PROTECTION OF ANIMALS FROM FLIES.

DATURA STRAMONIUM (THORN APPLE) AS A PREVENTIVE TO FLIES.

COMPARATIVE experiments by Hassekieff, in Bulgaria, with tobacco juice, the juice of *Daphne mesereum*, and a decoction of *Datura stramonium* (a European annual which has become naturalised about Queensland towns), have shown that this last is superior to others, and that a single application of the decoction to the exposed parts preserves the animal during the day against the bot and other flies.—*Bulgarian Journal of Veterinary Medicine*.

BARBED WIRE AND HIDES.

WE should be pleased to learn that barbed wire for dividing fences was done away with. It is all very well for a boundary fence where there are stray cattle, but what common-sense person would partition off his calf and horse paddocks with this hide-destroying, horse-killing abomination? Look at any dairy where barbed wire is used in the yards; then go and examine the cows. You will find valuable cows with lacerated teats, cows and calves with torn hides, other animals hardly able to walk, owing to getting a foot through this wire. If only from a selfish instead of a humanitarian point of view, the barbed wire curse should be put an end to. The hides of cattle torn by it are depreciated in value. Fat beasts badly injured soon become poor, and hundredweights of wool are annually lost in the fences. To run a horse against a stout barbed-wire fence is almost sure to end in the animal's death. And still barbed wire is used.

AGRICULTURAL AND HORTICULTURAL SHOWS.

THE Editor will be glad if the secretaries of Agricultural and other Societies will, as early as possible after the fixture of their respective shows, notify him of the date, and also of any change in date which may have been decided on.

LIST OF AGRICULTURAL, HORTICULTURAL, AND PASTORAL SOCIETIES AND ASSOCIATIONS IN QUEENSLAND.

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Allora ...	Central Downs Agricultural and Horticultural Association	J. H. Buxton... ..	7 Feb., 1899
Beaudesert ...	Logan and Albert Pastoral and Agricultural Society	M. Hinchcliffe ...	6 May
Beenleigh ...	Agricultural and Pastoral Society of Southern Queensland	Wilson Holliday ...	30 Sept.
Birthamba ...	South Kolan Agricultural and General Progress Association	G. W. Nixon ...	
Blackall ...	Barcoo Pastoral Society	F. Clewett ...	
Boonah ...	Fassifern and Dugandan Agricultural and Pastoral Association	J. A. McBean ...	28 April
Booyal Scrub ...	Booyal Progress Association	H. Masson ...	
Bowen ...	Pastoral, Agricultural, and Mining Society ...	J. E. Smith ...	8 June
Bowen ...	Preston Farmers' Association	R. A. Foulger ...	
Bowen ...	Proserpine Farmers' and Settlers' Association	G. W. Pott ...	
Brisbane ...	Horticultural Society of Queensland ..	G. K. Seabrook ...	21 and 22 April and 10 Oct.
Brisbane ...	Moreton Agricultural, Horticultural, and Industrial Association	J. Duffield ...	
Brisbane ...	Queensland Acclimatisation Society	E. Grimley ...	
Brisbane ...	Queensland Fruit and Economic Plant Growers' Association	G. K. Seabrook ...	
Brisbane ...	National Agricultural and Industrial Association of Queensland	H. C. Wood ...	10, 11, and 12 Aug.
Brisbane ...	Queensland Stockbreeders' and Graziers' Association	F. A. Blackman ..	
Brisbane ...	United Pastoralists' Association	Fredk. Ranson ..	
Bundaberg ...	Bundaberg Agricultural and Pastoral Society	A. McIntosh... ..	12, 13, and 14 Oct.
Bundaberg ...	Bundaberg Horticultural and Industrial Society	H. E. Ashley... ..	
Bundaberg ...	Woongarra Canegrowers' and Farmers' Association	H. Cattermull ...	
Burpengary...	Burpengary Farmers' Association	C. H. Ham ...	
Caboolture ...	Caboolture Farmers' Association	G. Mallet ...	
Cairns ...	Barron Valley Farmers' and Progress Association	W. F. Logan... ..	
Cairns ...	Cairns Agricultural, Pastoral, and Mining Association	A. J. Draper ...	28 and 29 Sept.
Cairns ...	Hambledon Planters' Association	E. Whitehouse ...	
Charleville ..	Central Warrego Pastoral and Agricultural Association	A. J. Carter ...	25 and 26 May
Charters Towers	Towers Pastoral, Agricultural, and Mining Association	W. Tilley ...	
Childers ...	Isis Agricultural Association	H. Epps ...	
Childers ...	Childers Progress Branch, Isis Agricultural Association	N. Rosenlund ...	
Childers ...	Doolbi Mill Branch, Isis Agricultural Association	W. T. H. Job ...	
Childers ...	Childers Mill Branch, Isis Agricultural Association	H. Epps ...	
Clermont ...	Peak Downs Pastoral, Horticultural, and Agricultural Society	F. Leysley ...	
Clermont ...	Peak Downs Dairymen and Settlers' Association	A. G. Pursell ...	
Cooktown ...	Cook District Pastoral and Agricultural Society	W. R. Humphreys ...	
Cordalba ...	Cordalba Farmers' Association	B. Goodliffe ...	
Currajong ...	Currajong Farmers' Progress Association ...	Wm. Howard ...	
Cunnamulla ...	South Warrego Pastoral Association	J. Winward ...	
Degilbo ...	Degilbo Farmers' Progress Association ...	F. A. Griffiths ...	
Gayndah ...	Gayndah Agricultural and Horticultural Association	J. C. Kerr ...	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Gin Gin ...	Pastoral and Agricultural Society of Gin Gin	E. K. Wollen ...	
Gladstone ...	Gladstone Pastoral and Agricultural Association	W. J. Manning ...	
Gooburrum, Bundaberg	Gooburrum Farmers' and Canegrowers' Association	W. J. Tutin ...	
Goondiwindi	MacIntyre River Pastoral and Agricultural Society	A. Gough ...	
Gympie ...	Agricultural, Mining, and Pastoral Society	F. Vaughan ...	14 and 15 Sept.
Gympie ...	Gympie Horticultural Society ...	W. G. Ambrose ...	
Helidon ...	Helidon Scrub Farmers' Progress Association	M. Morgan ...	
Herbert River	Halifax Planters' Club ...	H. G. Faithful ...	
Herbert River	Macnade Farmers' Association ...	E. C. Biggs ...	
Herbert River	Ripple Creek Farmers' Association ...	J. W. Grimes ...	
Herberton ...	Mining, Pastoral, and Agricultural Association	John M. Hollway ...	11 and 12 April
Hughenden ...	Hughenden Pastoral and Agricultural Association	W. H. Mulligan ...	10 and 11 May
Ingham ...	Herbert River Farmers' Association ...	P. S. Cochrane ...	3 Sept.
Ingham ...	Herbert River Pastoral and Agricultural Association		
Ipswich ...	Ipswich and West Moreton Agricultural and Horticultural Society	P. W. Cameron ...	6 Oct.
Ipswich ...	Queensland Pastoral and Agricultural Society	Elias Harding ...	1 and 2 June
Kalkie ... (Bundaberg)	Woongarra Canegrowers' and Farmers' Association	O. H. A. Kraak ...	
Kandanga (near Gympie)	Kandanga Farmers' Association ...	N. Rasmussen ...	
Kolan ...	Kolan Canegrowers' and Farmers' Association	C. Marks ...	
Laidley ...	Lockyer Agricultural and Industrial Society	John Fielding ...	27 and 28 July
Loganholme ...	Logan Farming and Industrial Association ...	F. W. Peek ...	
Longreach ...	Longreach Pastoral and Agricultural Society	J. P. Peterson ...	12 April
Lucinda Point	Victoria Farmers' Association ...	W. S. C. Warren ...	
Mackay ...	Agricultural, Pastoral, and Mining Association	F. Black ...	
Mackay ...	Pioneer River Farmers' Association ...	E. Swayne ...	
Maryborough	Maryborough Horticultural Society ...	H. A. Jones ...	
Maryborough	Wide Bay and Burnett Pastoral and Agricultural Society	G. Willey ...	27, 28, and 29 July
Milbong ...	Milbong Farmers' Association ...	T. R. Garrick ...	
Mitchell ...	Mitchell and Maranoa Pastoral, Agricultural, and Vinegrowers' Association	H. J. Corbett ...	
Mosman River	Mosman River Farmers' Association ...		
Mount Mee ...	Mount Mee Farmers' Association ...	R. Thomas ...	
Mount Morgan	Mount Morgan Mining, Agricultural, Poultry, Pastoral, and Horticultural Society	G. Orford ...	
Mulgrave ...	Mulgrave River Farmers' Association ...	Thos. Swan ...	
Nerang ...	South Queensland and Border Pastoral and Agricultural Society	W. J. Browne ...	
North Isis ...	North Isis Canegrowers' Association ...	W. J. Young ...	
Pialba ...	Pialba Farmers' Association ...	J. B. Stephens ...	
Pinbarren ...	Pinbarren Agricultural and Progress Association	H. Armitage, senr. ...	
Rockhampton	Central Queensland Farmers' and Selectors' Association	T. Whitely, Coowonga	
Rockhampton	Central Queensland Pastoral Employers' Association	G. Mackay ...	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued*.

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Rockhampton	Central Queensland Stockowners' Association	R. R. Dawbarn ...	10 and 11 May
Rockhampton	Rockhampton Agricultural Society	R. R. Dawbarn ...	
Roma ...	Western Queensland Pastoral and Agricultural Association	H. K. Alford ...	10 and 11 May
Roma ...	Yingerbay Farmers' Association	F. E. Glazier... ..	25 Aug.
Rosewood ..	Farmers' Club	P. H. Adams... ..	
Springsure ...	Queensland Pastoral Society	G. R. Milliken ...	
Stanthorpe ...	Border Agricultural, Pastoral, and Mining Society	Geo. Simcocks ...	
Stanthorpe ...	Stanthorpe Horticultural and Viticultural Society	R. Hoggan	
St. George ...	Balonne Pastoral and Agricultural Association	T. M. Cummings ...	
Toowoomba	Darling Downs Horticultural Association ...	H. Hopkins	2, 3, and 4 Aug.
Toowoomba	Drayton and Toowoomba Agricultural and Horticultural Society	H. Symes	
Toowoomba	Royal Agricultural Society of Queensland ...	F. Burt	
Townsville ...	Townsville Pastoral, Agricultural, and Industrial Association (formerly North Queensland Pastoral and Agricultural Association)	J. N. Parkes	
Wallumbilla	Wallumbilla Farmers' Association	P. W. Howse	
Warwick ...	Eastern Downs Horticultural and Agricultural Association	J. Selke	
Wellington Point	Wellington Point Agricultural, Horticultural, and Industrial Association	J. B. Blaine	6 Aug.
Woombye ...	Woombye Fruitgrowers' Association	P. S. Hungerford ...	
Woowoonga	Woowoonga Scrub Farmers' Association ...	H. B. Griffiths ...	

ENOGERA SALES.										SEPTEMBER.		
Article.										Top Prices.		
										£	s.	d.
Bullocks	...	...	...	...	...	...	...	...	...	6	1	3
Cows	...	...	...	...	...	...	...	...	...	3	18	7½
Wethers, Merino	...	...	...	...	...	...	...	...	...	0	13	9
Ewes, Merino	...	...	...	...	...	...	...	...	...	0	10	0
Wethers, C.B.	...	...	...	...	...	...	...	...	...	0	13	1½
Ewes, C.B.	...	...	...	...	...	...	...	...	...	0	11	10½
Lambs	...	...	...	...	...	...	...	...	...	0	11	8
Baconers	...	...	...	...	...	...	...	...	...	1	16	4
Porkers	...	...	...	...	...	...	...	...	...	1	8	6
Slips	...	...	...	...	...	...	...	...	...	0	11	0

Orchard Notes for November.

By ALBERT H. BENSON.

THE earliest varieties of Summer fruits will be ready to market during November; and as this is the beginning of the season, I beg to call the special attention of every fruitgrower in the colony to the importance of gathering and destroying all fly-infested fruits now if he wants to save any crop at all, as the neglect to destroy the first crop of flies will result in the loss of the succeeding crops of fruit. It is impossible to over-estimate the importance of destroying the early crops of fruit flies, as if left alone they breed so rapidly that the fruit crop is soon infested and destroyed.

The best way of destroying the first crops of flies is to gather and boil all infected fruit; such fruit, when boiled, to be fed to pigs or other animals. Feeding the fruit without boiling will result in the escape of a number of the maggots, and is therefore undesirable, besides being contrary to the Regulations of the Diseases in Plants Act.

Every fruitgrower should make it his business to see that his orchard is kept free from this pest, and not only his own orchard, but that his neighbours keep their trees free as well. All useless trees, such as inferior seedling peaches, guavas, &c., growing by hedge or fence sides, should be destroyed, as the fruit is valueless, and only becomes a harbour and breeding-ground for the fly. Unless fruitgrowers take action—combined and systematic action—to deal with this pest, it will never be kept in check; and for such action to be effective it is best to destroy all trees that produce unsaleable fruit, and to concentrate one's energies in keeping such trees clean that produce fruit of such a quality that it will command a ready sale. The marketing of fruit is a matter also that requires much more care and attention than is usually bestowed upon it. In many instances really good fruit is completely spoilt by carelessness in gathering, handling, and marketing, and is consequently valueless; whereas had it been carefully gathered, properly graded for size and ripeness, and packed in such a manner that it will carry well without bruising, and when opened up show to best advantage, it would have realised a satisfactory price. First-class fruit always pays to be well handled and well packed, as for such fruit there is always a good demand; but for badly handled, undersized, and bruised fruit there is little if any demand—at any rate, at remunerative prices. First-class early peaches, such as the Alexander or Brigg's Red May, grown on the Downs, would pay to be carefully wrapped in tissue paper and packed in trays holding one layer of fruit, as, if marketed in such a manner, they could be placed on the Brisbane market in first-class condition, and would realise good prices. First-class apricots, such as the Moorpark, would also pay to be handled in the same manner. Fruitgrowers should bear in mind that the better condition in which they market their fruit, and the more attractively it is got up, the better the chance of its realising a satisfactory price.

During the month, the Orchard should be kept well cultivated, especially in districts where the rainfall is light; and in such districts, if water is available for irrigation, a good watering should be given to all fruit trees and vines. By a good watering I don't mean damping the surface, but giving the soil a thorough soaking, as one good watering is worth a dozen small ones. Attend to the summer pruning of all young trees, removing any superfluous branches and pinching back all strong growths. Attend to the cultivation of the nursery; stake all grafts or buds, so as to produce straight, well-grown trees, the bud or graft being topped at the height that it is wished to form the head of the future tree.

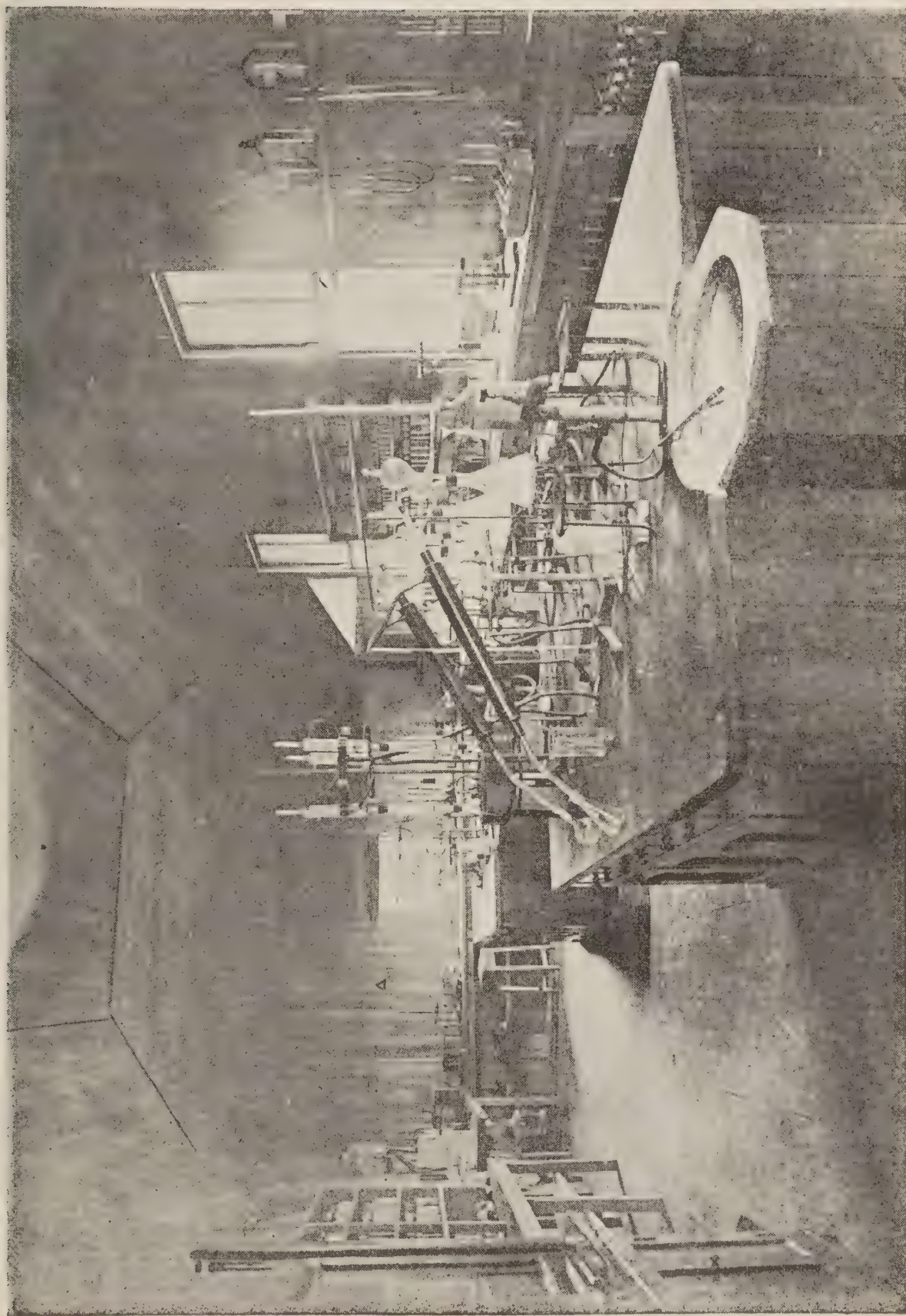
Farm and Garden Notes for November.

THE operations, as far as growing crops are concerned, will consist mainly of keeping the ground loose and clean. In many districts the early wheat harvest will have begun. The crop should be cut when thoroughly mature, but before it is quite ripe, as this will insure a better-coloured grain, and loss by scattering will be avoided. The same applies as to cutting oats for hay. When the crop is well in ear, but not mature, the plant is in its most nourishing state. Tobacco plants now require constant watching to prevent the ravages of caterpillars. The plants should be topped back, so that the full strength may be directed into the leaves destined for the crop. Sow imphee, setaria or panicum, teosinte, sorghum, maize, Kafir corn, and, generally, sow and plant as directed last month.

Kitchen Garden.—The benefit of well-trenched ground will become more apparent as the season advances. Shallow-worked land will not repay labour expended on it, unless it is well mulched with manure, &c. In sowing and transplanting during the summer months allow plenty of room, or the crops will be drawn and worthless. Good, deep, and constant cultivation will always pay in the kitchen garden. Keep the ground clean and open with the digging-fork and hoe. Thin out melon and cucumber plants, and loosen the earth round them. It is a good plan, and will save much of the crop if the branches are pegged down as they extend. This will prevent them being destroyed by high winds, and by so doing they will take root, and therefore ease the main root. Tomatoes planted out last month should be well watered and mulched during the prevailing dry weather. Sow cabbage, French beans, melons, lettuce, radish, pumpkins, cucumbers, rosellas, &c. Transplant for succession in calm cloudy weather.

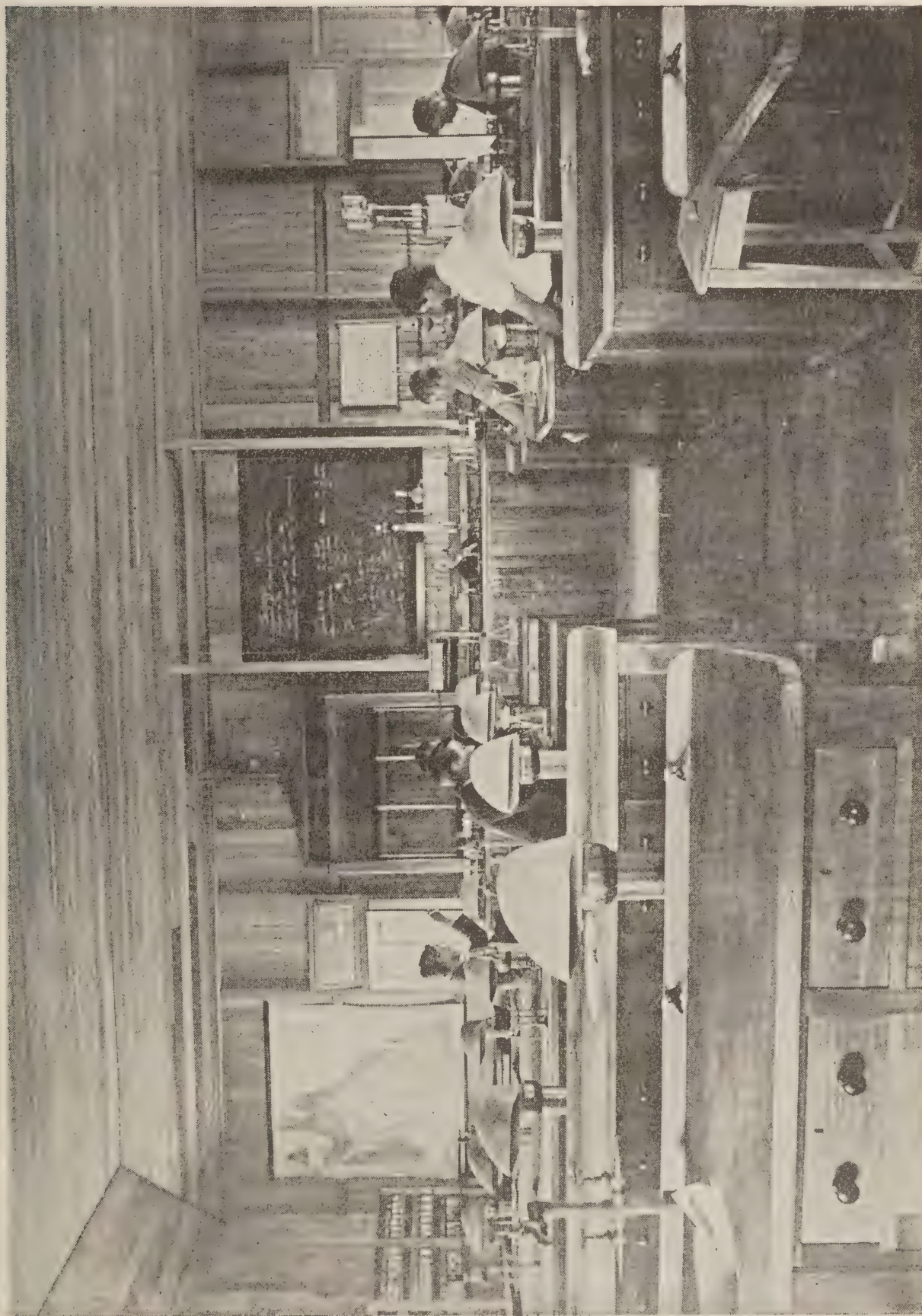
Flower Garden.—In many gardens dahlias are well above ground, and should be staked. Bulbs which were put away in a moist spot may now be planted out. Reserve the weaker bulbs for later planting, so as to ensure flowers for autumn. Bulbs that have done flowering should be taken up and stored for the season in a dry place. The flower garden should now be in full bloom and will well repay the trouble bestowed on it, and a little fertiliser of any description given as a top-dressing will assist the plants to bloom and look well for a longer period than with ordinary treatment.

Plate LVIA.



CHEMICAL LABORATORY, QUEENSLAND AGRICULTURAL COLLEGE.

Plate LVI_B.



CHEMICAL LABORATORY, QUEENSLAND AGRICULTURAL COLLEGE.

Senior Class-room.



WHEAT GROWN AT EMERALD—CENTRAL DISTRICT

Agriculture.

WHEAT HARVEST ON THE DOWNS.

THERE are two crops grown in Queensland which, as the harvest time comes round in the vicissitude of the seasons, have an especial interest for a very large section of the community, not only of Queensland but of the neighbouring colonies.

These two crops are sugar and wheat. Coming to maturity as they do, almost simultaneously, a couple of months before Christmas, the probable yields of each class of product are the universal topic of interest to the general public. And no wonder that it should be so. The very life of a country depends on its food supplies, and on no other article of that supply so much as on wheat.

As a product which is an enormous factor in wealth production, sugar holds a pre-eminent position in tropical countries, but without the staff of life—wheat—the world could not move along as it does, notwithstanding the vast supplies of maize and other cereals so largely used in many countries as a substitute for wheat. Rye, oats, barley, buckwheat, and many other grains form the staple food of nations, many of whom have their being close to or within the Arctic circle. Under the latter conditions, not only is rye a luxury—one which is the source of the Russian and Scandinavian black bread—but in some parts even this gives place to the dried inner bark of certain varieties of pine-trees. Here it is that a wealthy man is described as one who eats white bread on festive occasions!

In Queensland we are reduced to no such straits. It has been proved that wheat of the best varieties will not only grow but will produce heavy crops from the New South Wales border to the southern limit of the most tropical portions of the colony.

Take the Central districts west of Rockhampton. There we have seen wheatfields which have far exceeded in produce the famous South Australian wheat districts. In this issue of the *Journal* we illustrate wheat grown at Emerald this season, which would put to the blush any southern wheats. In fact, we do not as yet realise the enormous area of land adapted to wheat-growing which we possess in this marvellously fertile country of Queensland.

Last year we produced over 1,000,000 bushels, and the average yield was 17 bushels, in round numbers, per acre. It is easy to understand that to obtain such an average over the whole of the wheat-growing centres there must have been many hundreds of acres which yielded far more, even up to 30 and 40 bushels per acre. Rust and unsuitable conditions always tend to reduce the average.

This year the rust has been conspicuous by its absence, as a general rule. The harvesting operations have not exhibited the spectacle of men, horses, and reapers enveloped in a cloud of red rust. On the contrary, the straw and flag have proved almost clean, and had it not been for the abnormally dry season experienced since the first sowings in May, broken only by one or two showers, the yield all over the colony must have been a record one.

As it is, there appears to be little doubt that from 600,000 to 700,000 bushels will be the total output for the season, notwithstanding the fact that so much more land has come under wheat cultivation during the past year.

Celebrated as are the Darling Downs for their great industry, it is not surprising that universal attention should be directed to its progress as each year brings its harvest. The dry weather, which has hitherto militated against the rapid growth of any crop—be it wheat, maize, potatoes, or any other staple product—has been most favourable to the progress of the wheat harvest on the Downs.

It is quite impossible to give an idea on paper of the exquisite beauty of this portion of the Southern district at this moment. Those who have been privileged to witness harvesting operations in the old country can alone draw a comparison between our Queensland wheat country and that of old Britain.

Leaving out of the question the lands east of the Main Range, which are far more adapted to maize, potatoes, arrowroot, lucerne, &c., than to wheat, we will take our readers on a trip to Warwick and thence on to Killarney, the headquarters of the Trout Acclimatisation Society, &c., and erstwhile of the tobacco industry.

After leaving Toowoomba on the Western trip, a few paddocks of wheat are to be seen, some already in stook, others quite ready for cutting, and others again green as a young field of oats, having been planted far too late to give any hope of a good crop.

Further on, at Westbrook and Gowrie, there are some very fine fields, and the reaper and binder is hard at work, taking advantage of the fine weather to get the crop saved. Some wheat here has been cut for hay, and its place has been taken by a crop of maize which, despite the hot weather and drying winds, looks very healthy indeed. At Clifton matters are not at all bright; in fact, it would appear that as a general rule the wheat here has been a bad failure. At Back Plains there are some fields which will yield well; but at King's Creek, Greenmount, Goomburra, Table Top, and Allora, although here and there the farmers will have a good crop, the wheat on the whole is very unsatisfactory. We noticed some nice patches at Hendon. This is owing, we understand, to the fact that Hendon was much more favoured with rainfall than the Allora district. Taking the Central district, the results will probably bear out our estimate of a much reduced average yield for the season 1898. After reaching Warwick it is that the traveller gets into the heart of the wheat district. Even close to the town the reaper and binder is seen at work, and thence to Killarney the eye wanders over some of the most beautiful rural scenery it is possible to conceive. Swan Creek, Mount Sturt, Yangan, Neereadah (or Farm Creek), Emu Vale, all present pictures which, were it not for the universal iron roofing, vividly recall to mind the snug British farm-houses and rickyards nestling in the midst of the good old-fashioned plane, oak, and pine trees, with their gardens, both flower and vegetable, orchards and vineries. Yangan is one of those country towns prettily situated amongst the hills, and surrounded by one of the most beautiful amongst the many beautiful agricultural districts of the Downs. Far as the eye can reach, little else of cultivation is visible but waving fields of golden grain, with its rolling billows raised by the high wind blowing at the time of our visit. The gold and brown fields are relieved here and there by occasional patches of late-sown wheat still in the dough stage, and by large fields of young maize, which has already taken the place of very early wheat.

On all sides the harvesting machinery is at work, and most of the conversation so far has reference to the respective merits of the Buckeye, the McCormick, the Massy-Harris, and other well-known reapers and binders, and to the probable yield of this or that field. A noticeable feature is the absence of rust. Last year the drivers appeared to have been liberally powdered with fine iron rust. It lay thickly on the parts of the machines at rest; it gave a uniform colour to horses, men, and machines. This year nothing of this is apparent, the straw being perfectly bright and clean. We noticed that carriers attached to the binders are generally used. By their help a very large saving in labour is effected, inasmuch as the sheaves are laid close together at regular intervals, three sheaves being carried and dropped together, instead of each being pitched out on the ground as it was bound. This enables stooking to be done much more rapidly, as the sheaves do not require to be carried any distance by the stokers. Some farmers always "cap" their stooks, but the majority say this is of little use, as a high wind invariably blows down the capping sheaves.

As the harvesting goes on, experts in machinery travel about fixing up new binders, instructing the farmers in their use, and repairing and adjusting others, at no cost to the owner. Everywhere we noticed the splendid condition of the fine horses used in farming operations. Every wheat-grower has a large number of horses, so that by relays the heavy work of reaping can go on from early morn to dewy eve, without unduly working the cattle.

There is one blot on the scene, however, and that is the number of fields of "dirty" wheat. To such an extent are some fields studded with wild oats that it is hard to tell whether oats or wheat predominate. One farmer, on being asked whether a certain patch consisted of oats or wheat, said: "If oats are dear this will be a field of oats, but if wheat is dear it will be wheat." This was much on a par with the request of a visitor at a boarding-house, who, on getting a cup of some liquid for breakfast, said to the waiter: "If this is tea take it away and bring me coffee, but if it is coffee take it away and bring me tea." The large percentage of oats and barley in some of the wheat areas must have a serious effect upon the farmer's profits, and cuts two ways. If he leaves his wheat to ripen, then the oats shake out and lie ready to reproduce the evil a hundredfold next season. If he cuts his crop before the oats are ripe, then the wheat is too green, and the grain will shrivel in the stook. It might be a good idea to throw such fields out of cultivation for a season, or to plant corn on them, and so get rid of the oat trouble. On some fields the farmers had gone over their fields three or four times, and had taken out these "strangers," and the effect was plainly to be seen in the clean, even look of the wheat. The varieties mostly grown are Allora Spring, Budd's Early, Ward's Prolific, and Belatourka. There are several beautiful fields of malting barley to be seen.

As one rises out of the plain towards the scrub lands, the wheat crops appear to be heavier and cleaner than on the plains. At Emu Vale there should be a very good average, the grain being plump and ears well filled. Large quantities of potatoes are grown on the scrub lands; but owing to the want of rain the crop will be a light one. Increased prices, however, will compensate in some degree for small yields, and, in addition, the smaller tubers will come in handy for seed for the winter crop. On the scrub selections, although the wallaby fences remain, the marsupials have quite disappeared on the older lands, and only trouble those who are battling with the scrub higher up. The best crop of potatoes this season will probably be turned out by Mr. Peter Hoilberg, of Emu Vale.

At Gladfield, Messrs. Tom Ryan and Ed. Nolan, familiarly known as Big Ned Nolan, have grand wheat crops, as has also Mr. J. Lyons.

On the uplands, beyond Emu Vale, there is a vast amount of cultivation both of wheat, maize, and potatoes. Disappointments have naturally occurred, as instance the case of two Victorians who rented a piece of ground here to grow onions, a much-favoured and valuable crop in a good season. They worked hard; but notwithstanding their energy and determination the hot, dry weather was against success, and they gave it up.

The earliest wheat in the district is that of Mr. N. Bishop. Fifty acres of his crop will probably yield over 5 bags per acre. Mr. W. Gillespie has 50 acres of newly broken up ground.

The Hon. G. Vanneck is now farming near Yangan, and has excellent wheat crops on what was known as Marriage's Farm.

Amongst the Emu Vale farmers whose crops look well and would yield well if it were not for so much of the "stranger" element in them are Messrs. Reaves Bros., Mitchell, Carmody, Atkinson, and Jones. At Danderoo, the best lot is that of Mr. George Alexander. The tobacco industry appears to be about extinct at Killarney. Several large sheds are all that remain to record the time when the farmers made good cheques out of the weed.

The industry may, however, revive under the instruction of Mr. Nevill, the Government Tobacco Expert, who has already aroused much interest in other parts of the colony in the industry, and has arranged experiments at the Agricultural College at Gatton. The timber industry appears to be booming, however, and the Killarney sawmills send timber all over the Downs.

The showers which fell on the evening of our visit freshened up the landscape wonderfully, and added much to its beauty. Unfortunately, during the storm, a hayshed belonging to Mr. McDougall, at Lyndhurst, was struck by lightning, and 40 or 50 tons of hay, together, of course, with the shed, were destroyed. We heard of other casualties due to the short, sharp storm. Only the previous week a heavy frost had visited the district, and had done serious damage to the potato crops and young corn.

Returning towards Warwick, the "Hermitage" Government Experiment Farm was visited. Mr. Ross, the manager, very obligingly showed us over the farm, and spared no pains to give us every information in his power.

The amount of work done at the farm is remarkable, considering the short time which has elapsed since Mr. Ross took charge. The total area of the farm is 240 acres, and, with the exception of a small grass paddock, the whole is under crop, and is everywhere clear of anything like weeds. The work of breaking up the land was begun in June, 1897, and the average amount of labour available has been only four men. The soil is of a peculiar nature. In wet weather it is extremely sticky, and as it dries it becomes excessively hard, and at such times no plough can touch it. Yet we found it to be all in fine tilth, and it could be seen that great care had been bestowed upon the crops, from the manner in which they had responded to the treatment.

The great drawback to the land is the occurrence of what in the far North are called "salt pans," here "alkali," patches. All the farms in the neighbourhood have more or less of these patches, which can be at once detected either by the failure of the seed or else by the green patches of wheat, giving a piebald appearance to the crop—yellow and green alternating. One field we saw in Jack Smith's Gully looked like a veritable Joseph's coat—purple, green, yellow, and brown. On some farms in the same neighbourhood the green and gold were seen in regular lines. Mr. Ross gave it as his opinion, in which Mr. R. Soutter, Inspector of State Farms, concurred, that

THE CAUSE OF IRREGULAR RIPENING

is, that in dry seasons, when the requirements for plant life can be more easily seen than during the rains, the alkali patches indicate the necessity for drainage. The whole thing lies in that. Small depressions are then noticed in the fields, varying from a few square feet to many square yards. These are the salt pans. When the seed is sown, the grain in the sweet soil germinates quicker than in these spots, where it sometimes fails altogether. When it does grow, the growth is so slow that the former has reached maturity often before the grain is even formed in the latter. Hence the alkaline soil is responsible for the irregular ripening. The superabundance of flag in some wheats on these areas is very apparent, and for this there is no explanation, beyond the want of drainage. An expert in wheatgrowing would lay it down as a fundamental law—drain.

Where this is not done, the farmer should grow beets and mangolds on the alkali spots, but drainage would be better, as it would clear away the alkali.

EXPERIMENT WHEATS.

There are over 400 varieties of wheat sown in rows for experimental purposes. The utmost care is lavished on these stud wheats to ensure their turning out true to name.

The larger wheat plots consist of 26 acres of Marshall's No. 3, sown at the latter end of May; 28 acres of Marshall's No. 8, sown three weeks later (27th June); 5 acres Belatourka, sown on the same date. This latter is a magnificent sample. The poorest portion of it will, it is confidently believed, return 5 bags per acre, and the larger area will yield from 6 to 7 bags.

Of Dr. Cobb's Improved Allora Spring, there are $2\frac{1}{2}$ acres sown late in July and in the beginning of August.

Alongside this we find $2\frac{1}{2}$ acres of Budd's Early Sown on the same date, and 5 acres of Marshall's No. 3.

Amongst the stud wheats are 42 varieties from nomenclature wheats grown at Wagga and at the Hawkesbury College, New South Wales, also some grown at Westbrook Experiment Farm.

Of the 400 and odd varieties of experiment wheats, 100 are Farrer's hybrids, most of which are the most promising wheats on the farm.

Marshall's No. 3, No. 8, and Belatourka, having been proved last year, have now been sown in quantity, as before said, for distribution, as they have fully justified their character as most suitable farmers' and milling wheats.

No rust whatever has appeared amongst the majority of the wheats here, a few only, showing rather strong signs of the disease.

Passing on, we come to the peculiar-looking Indian Club Wheats. These yield well, are clean, show no sign of rust, and are evidently good farmers' wheats, but nothing can as yet be said about their milling qualities till they have been tested.

One of the earliest wheats is the Japanese. It is earlier even than Allora Spring, and gives an immense yield. The grain is hard, and full of gluten. They are perfectly free from rust, whilst a wheat alongside it showed the rust parasite very strongly. Out of thirty varieties of Durum and Poulard (Egyptian), only one was in any way affected with rust. In this Egyptian group is included the Belatourka. They are all Macaroni wheats from the Mediterranean coast, and are used by millers for mixing with strong wheats. It would be worth the farmer's while to take a look at members of this group, such as the Medeah, Atlantic, Young's Bearded, and Egyptian C1 and C2.

The Fifes do not appear to be suited to the Downs.

BARLEYS.

Several varieties of barley are grown in the experiment plot. We noticed one particularly clean sample of Chevalier—the old Chevalier, not the so-called improved variety. Archer's Chevalier appears to be a later variety than the old, but yields heavily.

Chilian.—This grain is highly recommended for ripening ales and beers by mixing with the Chevalier. If barley as a rule carries from fifteen to sixteen grains on each side, it is considered very good. This old-fashioned barley gives from sixteen to twenty-five grains on each side.

One of the varieties seen here came from the Sea of Azov. It would appear to be a type of Cape Barley, but this is only surmised from its appearance, as the manager had never seen it before.

Skinless or Nepaul Beauty.—Only a small area of this is sown, it not being considered a judicious thing for the farmer to sow it for grain, but grown for fodder or hay it is unequalled, and will mature in eleven weeks.

Cow-pea does well here, and a fair acreage is now coming on well. Last year it was sown at four different times. That sown on the 2nd December grew best. The greatest objection to growing cow-pea is that it cannot be reaped with the machine, as it makes such a tremendous lateral growth. This difficulty could, however, in Mr. Ross's opinion, be obviated by sowing two rows 2 feet apart between the corn. Then if stover be made of the corn, the whole thing can be reaped together. Even if the corn is pulled, the mower can reap both stalks and cow-pea. It should be sown in the latter end of November or early in December, about 30 inches by 8 inches, or 36 inches by 8 inches, and the ordinary mower (not the binder) will do the work satisfactorily.

About eight acres of lucerne are grown at the farm, and this looks well in spite of the dry weather. Thirty varieties of potatoes are being experimented on. These will probably suffer, but will yield seed for further planting in February or March.

Two acres are devoted to vines, of which there are eighty-five varieties, including Zante and Corinth currants.

The orchard looks well, despite the severe treatment the trees received in the course of clearing them of insect pests. There are 1,500 trees of different varieties, some of which will shortly be in bearing. Nut-grass is very much in evidence on the farm, but it appears not to be such a nuisance as below the Range, and certainly not to be ineradicable, as many acres which were covered with it when uncultivated are now perfectly clean.

The next district of interest which well repays the visitor for his journey is Freestone Creek. We have, in a former number of this *Journal*, so thoroughly described the district, the farms and the indomitable persevering farmers, that we should but be repeating ourselves if we were to describe them too minutely.

Suffice it to say that Freestone Creek keeps up its character for heavy production, clean fields, and energetic work. Harvesting here is in full swing, and already stack-building has begun.

A quantity of new land has been taken up and put under rough cultivation at Mount Tabor. The yield here will, however, not reach much above 2 or 3 bags, as the seed was sown on freshly broken land, on which little labour had been expended. Some farmers had taken off a crop of corn, and then sown wheat broadcast on the same land. In such cases big returns are not to be expected.

We took some pains to ascertain where some of the best crops were likely to be reaped. As might be expected from their reputation as wheat farmers of years' standing and experience, the names of Messrs. Arthur and Reuben, and George and Addison Free, Tulloch, and Weedman are well to the front. Mr. T. McGahan has a good plot of 100 acres of wheat and barley.

Mr. B. Hughes has some excellent Indian pearl wheat.

Amongst the men of Freestone, Messrs. Robert Craig and James Wilson have good areas of clean wheat, the latter some really grand wheat as one could wish to see. Messrs. James and John Shelley, farmers of the good old Staffordshire type, with T. Armstrong and And. Watt, of Jack Smith's Gully, are also among those whose crops will respond heavily to the evident care bestowed on them.

We cannot naturally be expected to enumerate all those who constitute the backbone of the wheat industry of the Downs. They have increased so much lately, and are still so rapidly increasing, that it will soon require a gazetteer to name the men who will form a continuous link before long, from Toowoomba to Killarney, of wheatgrowers, who will also join hands across from Swan Creek to Freestone Creek, and from Mount Tabor to Mount Sturt. Making a late call at the hospitable home of Mr. Jas. MacIntosh, at Blink Bonny, we bade a regretful farewell to a district, or rather series of districts, which, more than any other in Queensland, brings vividly before the visitor visions of the old homes of Devonshire, Somerset, and other lovely farming counties of the old country.

The "Sunshine Harvester" has been introduced on the Downs, and is now at work on Dr. Tilley's farm, where the hybridisation of wheat has engaged attention, Indian Pearl (a club wheat) having been successfully crossed with Velvet Chaff.

The question of the use of the stripper is a vexed one as much as it was in South Australia, and we shall possibly have partisans of Stripper *v.* Binder bringing forward their views *pro* and *con*.

In favour of the stripper, we have the fact that it strips, threshes, winnows, cleans, grades the wheat, and, by only taking the heads of the wheat, no chance is given to the Hexham Scent to come into the contract.

Against this we have the loss of straw, and what is still more to the point, according to some who should be good authorities, a damage to the grain, inasmuch as the grain must not be too ripe when the stripper is set to work. Now as the grain continues, after being cut and stooked in the ordinary way, to draw every particle of nourishment from the straw, it is certain not to pinch if cut at the proper moment. The grain reaped by the stripper, on the other hand,

is said to shrivel after bagging, as it has not been allowed to mature on the straw, and has nothing to draw upon to build it up afterwards. These are, of course, individual opinions, which we give for what they are worth. The proof of their correctness can be substantiated or disproved, as the stripper is now actually at work in the district.

We had several conversations with farmers of experience on the subject of stacking and of thatching stacks, and were rather surprised to learn from several old wheatgrowers that they held strongly by stacking on the ground and with absence of thatching. One grower said: "A properly built stack need not necessarily be thatched; but if a farmer could afford to wait some time before getting his grain threshed, then it would hold better in the stack, and thatching might be of some use." Certain cereals are better for being in the stalk, and therefore should be stacked.

As to the matter of building foundations, one farmer, who has had a great deal of experience in stack-building, declares that it is a great mistake to lay any foundation, and certainly not one raised on piles of stone, brick, or wood. If the stack is at all damp when made, or if moisture should get into it during wet weather, then the stack will heat to combustion point, a current of air is set up beneath it, and the loss of the stack by fire follows. His idea is to build on the ground, dig a trench round the stack, and to build up the roof in such a way that no thatch is required. He declares that he has never lost a bushel of grain by this practice during all the years he has been farming. We have already pointed out that, no matter how the first or bottom layers are put into a stack built on the ground, moisture *must* arise by capillary attraction, and that moisture can only pass to the atmosphere in one way—i.e., through the stack. It needs but to look at the horizon on any of our present hot days to see the moisture evaporated from the soil passing into space, and the conclusion must be arrived at that, no matter how apparently dry the surface of the soil may be, this moisture must pass out, and so affect the grain in the stack, even if no rain came in through the roof. A novel kind of foundation will be laid down this season at the Hermitage, which will ensure ventilation by very ingenious means. If one stack were built on this and another on the ground, an excellent object lesson would be afforded.

Before leaving Warwick, we noticed some very fine crops of onions grown in the neighbourhood of the town. Further out, a crop of about five acres had partially failed owing to the alkali above mentioned.

As harvesting will be universal before this article appears, we will indulge in no individual forecasts as to yield. As a whole, the Queensland crop may yield between 600,000 and 700,000 bushels, but this will be made clearer in a few weeks from now, when the thresher has got on with its work. Meanwhile, we will conclude this article with the advice of Mr. G. Crisp, miller, of Toowoomba, to the Downs farmers:—Say early in January put a little land under wheat; we then get good rains, and it will bloom in May before the frosts come on, and will be ready to harvest in June. We always have fine weather at that time of the year. If frosts come on after the wheat is out of bloom it will not hurt it. If this could be carried out it would regulate prices very much, and I think the second sowing would have less risk in the way of rust and thunderstorms than the May-sown wheat.

WHEN TO CUT WHEAT.

AMONG the many new ideas which have been adopted by the present generation of farmers, is that of early cutting; and it is a common observation that wheat, at least, cannot be cut too green. This is manifestly incorrect, but the true meaning is that wheat should be cut comparatively green. There are those who ride a hobby to death, and who, not content with moderation, go too far, and cut before the crop is mature. A few remarks upon the subject of wheat-ripening may be useful at the present time, as calculated to encourage discussion and moderate practice.

The two extremes would seem to lie between cutting "green" and cutting rotten ripe when the heads bend down and the crop becomes goose-necked. In seeking for a *via media*, or middle course, in order to secure the best result we must remember that there must be a time at which the wheat crop ought to be secured, and that even a day before or behind this period may be injurious to the interests of the grower. What, then, is the best time to cut wheat? If this question could be answered satisfactorily, it is still doubtful whether the information could be acted upon, as in farming we must do the best that we can, and be prepared in many instances to be doing what we know to be wrong. If we could control time and balance arrangements so as to cut our wheat in the nick of time, what ought to be its condition? To this inquiry some farmers would reply, Do not mind how green the straw is as long as the grain is firm, that is, about the consistency of cheese. Others would say, as soon as the grain ceases to be milky and becomes like curd it may be, and ought to be, cut. For my own part, I think it is easy to cut wheat too soon, and that many samples are ruined by too early severance. The movement in favour of early cutting has, in fact, been pushed to an extreme, and it would be well to consider a few of the reasons which are usually given in defence of the system.

INCIDENTAL ADVANTAGES

No doubt it is an advantage to clear a stubble early. This is a consideration entirely independent of the question of the quality and quantity of the crop. It is true that stubbles are useful for grazing, or may be broken up for late turnips, or prepared for catch crops all the sooner and all the better if the corn crop is cut and carried early. So far so good, but the advantage may be purchased too dear.

It may also be urged that early cutting diminishes risks from wind and rain, especially the latter, in exposed situations. It is annoying to see corn blow out, threshed by the storm, but this again is a risk that may be avoided at too great an expense. The actual time for cutting corn should not be regulated by such considerations, which indeed cut at the very root of corn cultivation. The crops must be allowed to mature, and the proper time to cut wheat is no doubt when it is ripe.

ACTUAL ADVANTAGES CLAIMED.

It is claimed in favour of early cutting that both grain and straw are of better quality, that the yield is as large, that the bushel is heavier, and that the sample is brighter and stronger. This is true in contradistinction to late cutting; but we are still left in doubt as to when exactly to put in the sickle. First, I would point out an inconsistency with regard to the quality of the straw being better as fodder. If, as we are taught, the process of ripening consists or is accompanied with a gradual transference of nutrient materials from the entire plant to the ear, it must be important to allow full time for the process to be completed. The transference must presumably be from the entire plant, roots, stem, and leaves, and severance must be a rude shake to the process. Corn will ripen in stook, but why should it ripen in stook better than on its feet? It appears highly improbable that a process which is alleged to take place in the stook should do so there better than in the natural position. Before cutting, the sap must move more continuously than after cutting; and therefore the early cutting must tend to check the full development of the grain. If the straw is really more nutrient when cut green, it must be at the expense of the grain which has manifestly not obtained all that it could have taken from the straw. The argument that the straw is more nutritious when cut green really appears capable of being used as a very good reason for not doing so.

If we turn to the grain, it is alleged that early cutting gives a heavier and better sample, and an equal yield per acre. This, however, must be true or false, according to the period selected for cutting. It is true if contrasted with

really late cutting, but it is false if held to be true as regards premature cutting. Wheat can be cut too soon, as no doubt it often is, with the result of pinched or shrivelled grain.

If the entire crop is cut green, it stands to reason that some of it must be greener still—that is, insufficiently filled. If it is cut when decidedly ripe, some of the late ears will have benefited by the delay.

THICK BRAN.

It is stated that the last act of the wheat plant is, after forming the grain, to thicken the outer skin or bran. This may be so, but it also may easily be one of those text-book assumptions which require corroboration. It is just as probable that the last act of the wheat plant is to stock or stuff the starch cells with granules of starch, and thus produce flour, as indeed a respected authority, the late Mr. A. Stephen Wilson, declared to be the case. His dictum was, "The heaviest crop of grain is from ripe corn." Mr. Wilson found that the outer part of the kernel is ripe first, and ceases to enlarge, while the interior is still soft along the axis which deposits the material, so that a kernel in which the final particles of starch have not been sent down may be as plump outwardly as if those particles had been deposited. The conclusion that the bran thickens after the grain has arrived at maturity is, therefore, doubtful, and it appears more probable that a continued deposit of starch granules marks the last epoch in the life of the wheat plant.

STRONG AND WEAK WHEATS.

Strong wheats are rich in gluten, and weak wheats are less rich in gluten. Of course the percentage of gluten to the entire cereal must be lowered by a further accumulation of starch granules; hence a weak wheat may be richer in starch, and consequently comparatively poorer in gluten. There can be little doubt that the earlier agricultural chemists exaggerated the importance of gluten, but it is now generally conceded that the best wheat is that which contains the most starch. When, therefore, we are told that early-cut wheat is stronger, it simply amounts to this: That it contains more gluten; and it could be shown that the strongest wheat—*i.e.*, the richest in gluten of all—is found as hen corn, that is in small and immature grain, while the richest wheats are those richest in starch.

It seems, therefore, likely that the best period to cut wheat is when the grain is fairly hard. The degree of hardness may be illustrated as about that of firm cheese, or as easily cut in two by the thumb-nail, but not harder. To cut wheat much softer than this will probably result in a sacrifice of weight in each grain.—*Agricultural Gazette (England)*.

A CORRESPONDENT of the *Farmer and Stockbreeder* says:—About twenty years ago I was under the impression that we usually allowed wheat to become overripe before cutting, as both straw and grain would be all the better if cut a week or so earlier than was usual, and decided upon the following simple test. Eight days before a field of wheat was cut I took from a certain part, where the crop and heads looked regular and round, about twenty ears of wheat, and hung them up in the granary to fully ripen and dry. The day we cut the crop—eight days later—I took from the same spot a further twenty ears, putting these to dry and harden. When both lots were fully dry I tested the weight as follows. Rubbed out and counted 400 grains from each lot, and carefully weighed them. To my surprise the fully ripe lot weighed one-seventh more than that taken earlier, and on a second test, other grains from each parcel, the result was as nearly as possible alike. According to this simple experiment the cutting of wheat eight days before fairly ripe would result in a loss of weight of one bushel in every seven; rather a serious matter.

SELECTION OF SEED WHEAT.

Mr. R. W. DUNHAM, writing to the *Agricultural Gazette*, London, says:—The selection of the seed-wheat, having in view the improvement of both quantity and quality of the crop, must be confined to such varieties as will, with proper cultivation and manuring, reach the highest limit of development in the locality where they are grown. That there is ample room for improvement in the choosing of seed-wheat is evident to anyone at all acquainted with agricultural practice, for many wheat-growers—we are aware of the fact from constant intercourse with farmers—reserve their worst samples of wheat for seed, or sell their good grain, and buy inferior quality for sowing. The great inequality we frequently see in the length of the ears of wheat in a field indicates the negligence of the farmer in this direction, whereas if in selecting his seed he chose the longest ears of wheat in the field, taking care to secure the best type of grain, he would at once get rid of the inequality as well as the inferior mixtures to be found in all fields sown in the present indiscriminate manner. Shrunk or shrivelled wheat is always low in the proportion of its starch; and as the starch forming with the gluten, &c.—the endosperm—is put there to sustain and build up the future plant until it can expand its foliage above ground, it necessarily follows that, if seed wheat is very much shrunk, the supply of food in the endosperm will be inadequate for the needs of the young wheat plant. Even provided, therefore, that shrivelled wheat is known to be of pedigree stock, and can be bought at a lower price per bushel than the best grain, and that a bushel of it will contain a greater number of kernels, using it for seed is decidedly not economical, nor can it be profitable to the farmer in the end. As the seed is the organ of nourishment to the future plant, it will be readily understood how important it is to carefully pick out good and prolific seed in order to ensure a full return for the labour expended on the land, for “as the seed so the crop.” And although the vegetative power of the seed does not consist in the size or plumpness of the grain, as we have previously pointed out, it, however, stands to reason that a weak, light, and puny kernel cannot produce a strong plant or result in so large a total crop as a fully-developed grain. In order to satisfy himself on this question, a Mr. Ronald, of Glasgow, quite thirty years ago, purchased some white wheat such as was then sold for seed to farmers, and he extracted by means of a sieve with an appropriate size of mesh 25 per cent. of the smaller kernels, which he tried numerically against the 75 per cent. of the kernels that had not passed through the sieve on account of their being larger, with the following results:—

Large Seeds.—400 produced 316 plants and 1,572 ears, which weighed 106 oz.

Small Seeds.—400 produced 256 plants and 606 ears, which weighed 32 oz.

The weight in both cases included the straw of the ears, and the seed was dibbled at the rate of 2 pecks per acre. As we have pointed out, the objection to a poor sample sown as seed does not lie in the variety but in the poverty of the individual seeds, inasmuch as the seeds are the organ of nourishment to the future plant. During recent years many new and valuable varieties have been introduced into the seed market, and, in order that our readers may readily gauge the quality of the wheat that millers require, we would mention that the greater the weight per measured bushel the better the quality of the wheat or seed, but when farmers are selecting their seed-wheat they must also not overlook the matter of vitality or the suitability of the seed to their particular soil or climate. Good quality wheat, it will thus be noted, is of high specific gravity, and has well-developed grains.

Since Mr. Ronald's experiment on seed-wheat many farmers and others have made similar trials on a more extensive scale, and in this connection we may as well draw our readers' attention to a trial made by a well-known agriculturist. This gentleman carefully selected from a farm granary a measured

quantity of the smallest and an equal quantity of the largest and best developed grains, extremes as far as size of seed being aimed at. The weight per standard bushel thus selected was as follows:—

Largest seeds...	...	...	63·0 lb. per bushel
Smallest seeds	...	...	40·5 lb. per bushel.

These two samples were each divided into four lots and sown the same day, side by side, on eight plots of ground. The soil of the field was a clay-loam, and not manured, but was in good condition of tillage. During the trial it was noticed that the larger grains vegetated more rapidly than the smaller ones, and made better growth, and the result at harvest was as follows:—

PRODUCE PER ACRE OF DRESSED GRAINS.

						Quantity per Acre.		
						From Large Seeds.	From Small Seeds.	Difference.
						Bushels.	Bushels.	Bushels.
Plot 1	...	...	...	...	...	43·3	31·7	11·6
„ 2	...	...	..	...	...	34·2	25·0	9·2
„ 3	...	...	...	...	...	35·0	27·5	7·5
„ 4	...	...	...	...	...	45·8	33·3	12·5
Average						39·6	29·4	10·2

From this experiment it will be observed that the larger seeds contained a good quantity of good food stored away in the endosperm for the young plant, and in that food was a good percentage of gluten well developed, as the weight per bushel conclusively proves.

In order to show readers what can be effected by annual careful selection of seed, we may mention that Major Hallett succeeded in four years in increasing the size of the ear of wheat in the following ratio:—

					Length in Inches.	Containing Grains.	No. of Ears on Finest Stool.
1857 Original ear	...	...	...	...	4 $\frac{3}{4}$	47	...
1858 Finest ear	...	...	...	..	6 $\frac{1}{4}$	79	10
1859 Finest ear	...	...	...	...	7 $\frac{3}{4}$	91	22
1860 Ears imperfect from wet season	...	...	...	...	...	...	39
1861 Finest ear	...	...	...	...	8 $\frac{1}{2}$	123	52

Thus by means of repeated selection, coupled with thin seeding—1 bushel to 6 acres instead of the usual 2 to 3 bushels per acre—the length of the wheat ear was doubled, their contents nearly trebled, and the tillering power of the seed increased fourfold.

STACKING WHEAT.

It is much to be deplored that many farmers will not take the trouble to stack their wheat properly. They go to any amount of labour in producing a crop; they exercise every care in their selection of seed-wheat, in steeping the seed, and generally in doing all in their power to secure a crop; and then, when that end is achieved, they proceed to build their stack on the ground, regardless of the fact that, by capillary attraction, moisture is drawn up into the wheat to its manifest detriment. Not only does the damp extend some feet up the lower portion of the stack, but the warm steam permeates the whole structure, and subjects it to the influence of mildew.

With the warm, moist weather of January and February, the evil is accentuated by the production of insect life ruinous to the grain, such as weevils. In the old country, stacks are built on regularly prepared permanent platforms raised two or three feet from the ground on stone or brick pillars.

If our farmers would preserve their stacks from mildew, all they need do is to prepare a foundation on stumps in the same way as in the building of a cottage. If caps are put on the stumps so much the better, as the rats and mice cannot then get at the grain.

A large quantity of the last year's wheat crop is still on the farmers' hands owing to the presence of the now pestiferous "Hexham Scent" plant, which has impregnated the wheat to such an extent as to ruinously depreciate its value for the mill.

Again, very little care is evidenced in thatching the stack. Many stacks have been left unthatched, with the result that much of the upper portion is rotted by the rain water finding its way into it. With moisture rising from below, and moisture pouring in from above, the losses sustained by such careless stack-building are enormous, and the farmer who neglects obvious precautions has no one but himself to blame, and can scarcely be a subject for sympathy.

WHEAT AT EMERALD.

OUR frontispiece shows a splendid sample of wheat from the Central districts which has been forwarded to the Department of Agriculture, but no particulars concerning it have been received. We learn that it was grown by Mr. Scott, of Emerald Downs. It would have been most interesting to have known in what month it was sown, how the seed was treated, the conditions of climate during the season, weight of grain per bushel, soil, &c.; but as we have failed to obtain such information we merely give an illustration of the sample ears, as we consider them remarkably good, and well worthy of a place in the *Journal*. If such wheat as this can be grown throughout the district, then the Central portion of the colony cannot fail to come to the front as a locality eminently suitable for close settlement by wheat farmers.

WHEAT IN THE CENTRAL DISTRICTS.

A GENTLEMAN who has just returned from a visit to the Duaringa district (says the *Rockhampton Bulletin*) reports having visited the farm of the Messrs. Diamond Brothers, known as Blackmyre, situated about five miles out of Duaringa. There he saw some fine crops of maize, barley, and oats, and what pleased him most—a small patch of wheat. This is the first time the Messrs. Diamond have tried wheat, and they are perfectly satisfied with the result. A sample of the wheat has been brought to this office. It is perfectly free from rust, though not quite matured.

We (*Rockhampton Bulletin*) have received samples of wheat grown at Glenmore, North Rockhampton, by Mr. J. T. Harris. Mr. Harris furnishes no particulars respecting them. One sample is well grown; the ears are large and full. Of the other the ears are small; it is an awny wheat. Both samples appear to be rust infested. Mr. W. Kimber, whose farm is on Scrubby Creek, on the road to Fairy Bower, and within the municipality of Rockhampton, has handed us a nice sample of wheat grown by him, and cut. Straw and heads appear to be quite healthy: the latter is fair-sized and plump. The variety is not known. It was sown in March, and Mr. Kimber thinks it would have done better if sown a little earlier. The plants were healthy and sound, but the crop was thin. The plants near the creek did best. The soil is light, but rich in organic matter. An acre and a-half was sown broadcast. We purpose sending these and other samples to the Department of Agriculture. We shall be glad to forward other samples at the same time, and we would like those who send them to state—variety of wheat; when sown; yield per acre; character of soil; amount of rainfall, &c. By attending to such particulars farmers will be assisting our wheat experts to discover the best varieties of wheat for the various areas of the colony. It may be found that some of the Indian wheats will pay to cultivate in our coastal areas.

Plate LXIII.



WHEAT GROWN AT EMERALD—CENTRAL DISTRICT.

Plate LXIV.



MARKING AND PLANTING MAIZE AT WESTBROOK EXPERIMENT FARM.

A FEW HINTS ON MAIZE-GROWING.

BY HENRY A. TARDENT.

Manager of the Biggenden Experiment Farm.

MAIZE-GROWING is a vast and complicated subject, on which volumes could be written without exhausting it. In the following lines it is intended to dwell on a few points only, bearing especially on the cheapest and most profitable ways of growing and handling a crop. These notes have been first prepared at the request and read at one of the meetings of the Drayton and Toowoomba Agricultural and Horticultural Society. I now publish them in the *Journal* in a somewhat altered form, and with some additional facts and notes, together with illustrations of a few of the mentioned labour-saving appliances, for which, I understand, there have been inquiries from many parts of the colony.

Corn (or *Zea mais*, as botanists call it), is a Phalaridea of the Graminea family. It is a monoic plant—that is, on the same plant are to be found the male flowers (tassels) and the female flowers, the staminae emerging from the cob like a handful of hair. Maize originates probably from Central America, where for ages past it has formed the main staple of food of the redskin aborigines. But after the discovery of America by the Europeans maize has rapidly extended all round the world. At the present day it is cultivated in all the tropical and semi-tropical countries, and in the warmer parts of countries with a moderate climate. Wherever grown, it forms an important part of the food of man and farm animals, and gives birth to an extensive commerce of export to other less-favoured countries. Here, in Queensland, it is cultivated on 120,000 acres, giving about 4,000,000 bushels per annum.

It stands second only to sugar-cane amongst our agricultural products.

As a farm crop it succeeds admirably all along the eastern slope of the Dividing Range, the hot and moist climate of which seems to suit the plant well, although there it suffers sometimes from an excess of rain. On the Darling Downs, and further north on the western slope, maize grows well too, and the grain is usually of a superior quality. But, taken all round, the average crop is, I believe, inferior to that on the coast. This is due, no doubt, to our less copious rainfalls, and also to frosts, which occur here both earlier and later than on the coast. Further west, as far as Roma and Mitchell, excellent crops of maize are being occasionally gathered, but it is not there either a reliable or a profitable crop. The millets and sorghums, which stand the drought better, should there supersede corn as fodder crops, whilst Jerusalem and especially Kafir corn should replace it as a seed crop.

SOIL.

It goes without saying that maize, like many other plants, does best on a deep, rich, friable alluvial loam, such as is to be found along the banks of most of our rivers; also on scrub land. But with good cultivation and proper care it will grow on a much greater variety of soils. During the last season the writer has grown a very fair crop on a rather poor stony ridge, which one would have thought hardly capable of producing this sort of cereal.

SEED.

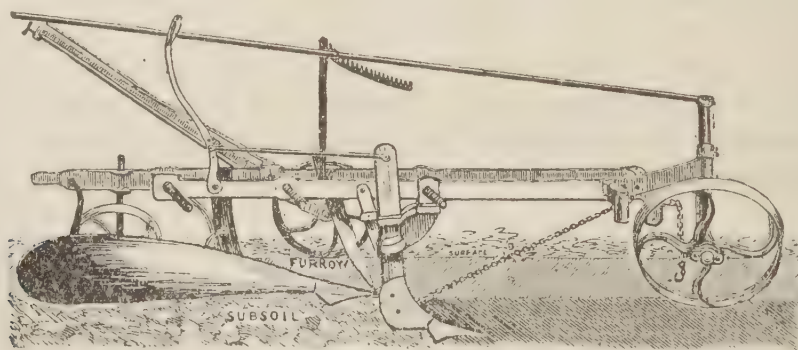
Too much care cannot be bestowed on the selection of seeds. They should not only be taken from the very best cobs, but also from the healthiest, strongest plants, which should be marked in the field before harvest. It pays also to chop off top and bottom ends of cobs, and to sow only the large, even seeds from the middle of the cobs. In some districts kangaroo rats or birds pull up the corn when it is just emerging from the ground. I have had whole rows destroyed in that way. To prevent this, dilute a small bit of tar in water, soak and stir the seeds well in it, then drain off the water, and dry the seeds well by throwing a shovelful of powdered lime or ashes on them, shaking

the vessel so that every seed gets its share. This will prevent their sticking together, and the lime will act also as a stimulant and manure round the young plants.

PREPARATION OF THE LAND.

On the care bestowed on the preparation of the land depends to a great extent the success of the crop. No plant is perhaps more responsive to thorough tillage. In examining the roots of a maize-plant at the various stages of its growth, we find that the first to appear—the food-gathering roots, as they are called—start from the seed in a radiating way, extending horizontally in every direction within 2 or 3 inches of the surface of the soil.* There they find not only the food for the young plant, but also the moisture and the warmth necessary to its life and growth. Later on, new successive sets of roots start from over the former ones at the bottom of the stem, and usually over the ground. But, instead of extending horizontally, they sink nearly straight into the soil, where they have been found to extend as deep as from 4 to 6 feet from the surface. These subsoil roots serve a double purpose; they keep erect a plant which offers a comparatively great height and large surface to the action of wind, and sustain it during the dry, scorching summer months, supplying it with the moisture it imperiously requires, especially at flowering time.

From the above-described habit of growth of the plant, one would think that the deeper the soil is stirred and pulverised the better should be the crop on it. Experience thoroughly confirms that inference. No ploughing for corn should be less than 9 or 10 inches deep. An additional subsoiling down to 18 or 20 inches will pay, perhaps not in one season, but certainly in two or three successive seasons. When done by a single-furrow plough, followed by a subsoiler in the same furrow, the work is somewhat slow and expensive. It takes two teams and three or four men, and can hardly be done for less than from £1 10s. to £2 per acre. But it can be done twice as quickly and proportionately cheaper by two men and one team only with a combination of plough and subsoiler together, the front foot of a double-furrow plough having the shape and depth of a subsoiler. Not only is such a method quicker and cheaper, but it has also a great superiority in the fact that the horses never tramp on the subsoiled furrow.



The land thus prepared in autumn should lie fallow during the winter, exposed to the influence of air, sun, rain, and especially frost. In the spring it should be either cross-ploughed or, still better, well pulverised with a strong cultivator (scuffler) set first 8 inches deep, and then crosswise 10 or 12 inches deep. Should the land be still lumpy, it should be gone over with spading and ordinary harrows until a perfect tilth is secured.

PLANTING.

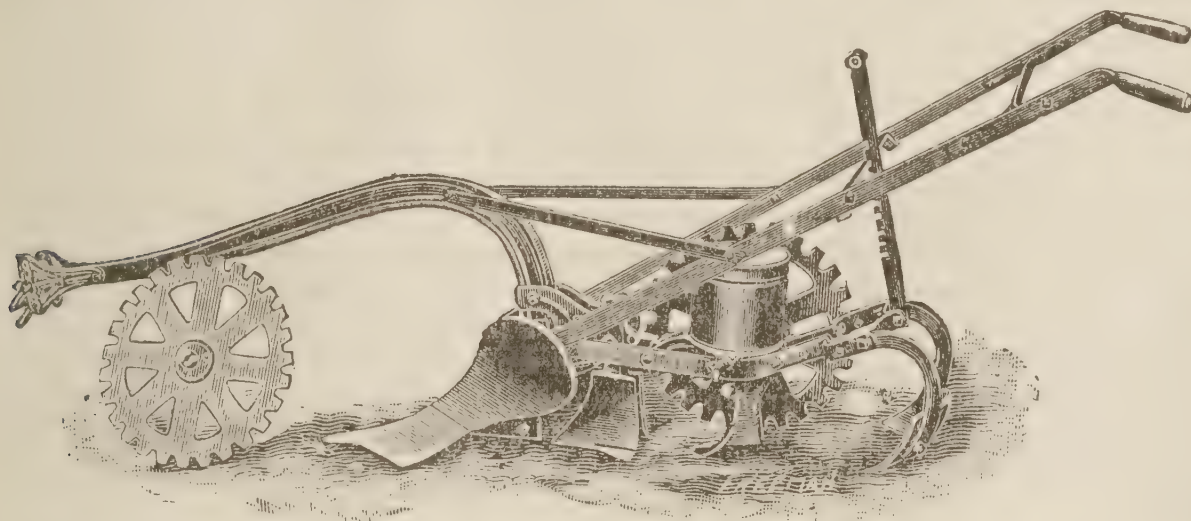
On the Downs planting commences as soon as frost is over—say, in September—and can be continued till about Christmas. The success of the crop depending so much on a few showers at planting, and especially at flowering

* These act also as stays to the plant, preventing its overthrow during high winds.—Ed. Q.A.J.

time, it is absolutely impossible to say whether early or late planting is preferable. Some years the early planting gives the best results, whilst another year it is the late crop which is the best. The wisest plan would be perhaps to divide one's field into three parts, planting one-third in September, one-third in October, and the rest at the end of November or beginning of December. In that way one would be fairly sure of a crop every year on at least two-thirds of the field. Besides, the various tillage operations would be more evenly spread and distributed throughout the season.

Here, in Queensland, the seeds are usually dropped by hand in the furrow, and covered by the sod of the following furrow. When the crop is 2 or 3 feet high, the land is ploughed again, usually with light single-furrow ploughs, the earth being thrown towards the stems of the stalks. Such a method may be necessary on the coast and other districts subjected to heavy rainfalls, to keep off an excess of moisture always prejudicial to the health of the plant. But it is certainly uncongenial to its nature, as it tears up and exposes to the sun and wind the horizontal surface roots before described, thus checking the growth of the plant. For the Darling Downs, and especially for districts situated further west, it is far preferable to drill in the seed by means of a Puritan Cornplanter or some other drilling machines.

For those who have not seen it, I might say that the Cornplanter is a single-furrow plough with a double mouldboard to open the drills. Under the share there is a kind of subsoiling hook or curved steel, stirring the bottom of the drill and making a fine seed-bed of it. Between the two mouldboards there is a seed-dropper, which can be regulated so as to drop the seeds at any distance. Then there are two small blades or spades of a peculiar shape which cover the seeds, whilst a little iron roller at the back-end of the implement makes the ground firm over them.



There are other cornplanters—some planting several drills at a time, but they are, so far, too complicated and expensive for the ordinary farmer, whom I have especially in view in the present article.

By means of the above-described inexpensive implement, a good ploughman, with two or three horses, according to the compacity or friability of the land, can do the whole operation of planting at a cost of about 2s. an acre.

If there is no possibility of procuring a Cornplanter, the work can still be done in a fairly creditable fashion by the following means, which I had to use last season at the Westbrook Experiment Farm:—A man opens the drills with a single-furrow plough. He is followed by a boy who drops the seeds; then comes another boy who covers the seeds with a Planet Junior scarifier, provided with two teeth only, set from 6 to 8 inches apart. In that way the work costs 4s. per acre, which is not very extravagant, although 100 per cent. dearer than with the Cornplanter.

I would like to emphasise, if possible, the advantages of drilling in the corn. The seeds lie at the bottom of a drill, say, 5 or 6 inches deep, and are covered by only a couple of inches of soil. They can thus take advantage of

the least showers (and these are precarious in the spring) as well as of all the warmth of the soil and sun-rays. They shoot up in single stems, with scarcely any suckers. The horizontal food-gathering roots are situated deeper in the ground, and are less exposed to be injured by subsequent tillage operations. Every scarifying brings more soil towards the stems as they grow, so that in a few weeks the corn is practically hilled up, although the land remains flat. It is really astonishing how such a tillage well suits the plant, and is conducive to a careful husbanding of any moisture available in the soil.

It goes without saying that on a sloping ground the drills should lie across the slope and not along it, so as to prevent the formation of gullies and the washing away of soil and seeds.

Whilst dealing with the question of drilling, I cannot help remarking, by the way, that many people appear to me to plant far too close, some even allowing barely 3 feet between the rows and 6 inches in the row. No use crowding corn. It is a plant which takes a considerable amount of its food direct from the atmosphere, and air must have free access to it. Better to have one well-nourished cob on a healthy, strong, isolated plant than to have two half-starved plants, each with a miserable-looking nubbin or deformed cob. Even when used for ensilage, corn should not be planted too close, as then the sugar and other nutritious principles cannot be elaborated by Nature. For small varieties, there should never be less than 4 feet between the rows and 12 to 15 inches in the rows; whilst for larger, late varieties, the distances should be 5 feet and 18 inches respectively.

SHOULD PUMPKINS AND OTHER CURCUBITACEA BE GROWN WITH CORN?

Perhaps not, if the pumpkins are sown in the same row as the corn. But if you sow four or six rows of corn, and then leave one row empty to sow the pumpkins in, you will find the combination of the two crops a most successful and profitable one. In that way one has plenty of time to well till the land along the corn before it is covered by the vines and leaves of the pumpkins. These then keep the weeds in check, and act as a mulch, maintaining the soil cool and moist during the great heat of summer.

As to the pumpkins, one is also better enabled to keep the land well tilled along them, to pinch and shape them, and to destroy, with Paris green, the little beetles often so destructive to that crop. The cornstalks not only shade the pumpkin vines and fruits, but act also as pegs for the tendrils to cling on, thus preventing the vines from being rolled up by the wind, as not unfrequently occurs when pumpkins are grown by themselves. True, this can be prevented by pegging the vines to the soil with small wooden forks, a method which is right enough for a small garden, but is too expensive and tedious for field culture.

HARVESTING.

Our usual way of harvesting is so far very primitive, and on the whole unprofitable. We allow the cob to get thoroughly matured and dry on the field, sometimes hanging for weeks in that state on the stalks. Then we go along the rows pulling off the cobs and carting them away. Then we go a second time along the rows, chopping down with primitive, blunt hoes the dried and now useless cornstalks, putting them into heaps and burning them, getting only a handful of ashes as a reward for our labour! What a tedious work! What a waste of energy, of time, and of valuable stuff! We may reasonably expect that such wasteful methods will soon be a thing of the past, and that future corn-growers have better times in store.

The Osbourne Columbia Cornharvester, introduced for the first time into the colony and used last season at the Westbrook Experiment Farm, is bound to do for the maize-grower what the reaper and binder have done for the cereal-grower. It is a strong, substantially built implement. Two horses walking on the left side of the row pull it along. Two sharp iron points pass, close to the ground, on both sides of the row, lifting any cornstalks which might happen

to lie on the ground. The stalks are then seized and kept erect by hooks of a peculiar shape, fixed on endless chains, moving rapidly towards the back of the machine. The stalks are meanwhile being cut, close to the ground, by an ingenious combination of a V-shaped fixed knife with a movable triangular knife, and carried further back into the gatherer. When there is enough of these to form a bundle or sheaf, a curved needle passes round and ties it in a way analogous to that used in reapers and binders to bind wheat-sheaves—with this difference, that in the cornharvester the stalks and sheaves are constantly in a standing or vertical position. A little curved knife cuts automatically the twine, and a simple device throws the bundle gently on the ground in less time than it takes to describe it. A man follows picking up the sheaves and stooking them in the field, where they are left until stalks and cobs are thoroughly dry. Stooking is easy enough, provided the work is done carefully and conscientiously. The stook should be started with four sheaves, the tops of which are kept together with a twine-tie, whilst the bottoms *should be well spread*; otherwise the wind is sure to blow the whole stook down. Other sheaves can now be added all round. In that way the crop can stand a good deal of rain and bad weather without being in any way injured.

On a level clean ground, the Columbia Cornharvester can cut up to 8 and perhaps 10 acres a day. On dirty ground, the wheels get sometimes clogged with grass. This could be easily obviated by fixing an iron sheet under the cogwheels. It saves all the stalks as a fodder, and a valuable fodder it is when chaffed and mixed with some lucerne or cowpea chaff. It makes the land ready for the plough some three or four weeks earlier than with the ordinary method of harvesting, thus allowing it to be ploughed before the autumn weeds have taken hold of it, and early enough for wheat-sowing. And last, but not least, it saves about 90 per cent. of the harvesting expenses. It might be objected that the implement, which costs from £30 to £40, is too expensive to be within reach of most farmers. So it is, but so are also reapers and binders, wheat threshers, &c. As in the case of the two last-mentioned implements, the difficulty can be overcome either by a few farmers combining to buy one or by a more wealthy farmer buying one for his own use, and cutting his neighbours' crops at a reasonable price, which would, I am sure, give satisfaction to all interested parties.

And then, for those who cannot in any way get the use of a cornharvester, the writer has made recently, at the Westbrook Experiment Farm, an exceedingly simple implement which cuts—but does not tie—from 10 to 12 acres a day, with a single horse and a man to drive it. It costs a trifle, and is thus within the reach of the shortest purse. It would certainly do for the small farmer who has a family to do the tying and stooking. It can be also of service to the dairyman, who can cut with it every morning one or two rows of greenstuff for his cows.

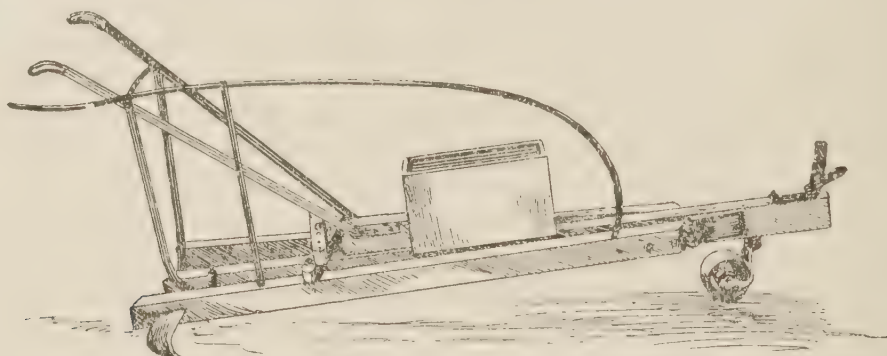
As there have been inquiries for it from various parts of the colony, I give here an illustration and a short description of the machine which will enable any farmer to make it himself, with only one or two pieces of iron to be got from any country blacksmith.

Take a piece of hardwood 3 inches by 4 inches—5 feet long. To this attach a hook on the front end to hang the swinglebar on. Then, about 6 inches from the end, fix a wheel from an old plough, and on the other end a pair of old plough-handles. Now take two pieces of hardwood, 4 inches by 2 inches, 4 feet long, and fix them on both sides of the centre piece by means of strong hinges, situated about 1 foot from the front end, which will allow them to open and shut at will, as required, to cut rows standing from 2 to 6 feet apart. Those side pieces are kept at the proper distance from each other by means of wooden cross pieces, 2 inches by 2 inches, provided with a few holes, and fixed by means of bolts, say, 1 foot from the back-ends of the side pieces. They are then bolted together on the centre piece.

Now the machine is complete except for a knife and a bender, which are both fixed on the right-side wooden piece.

For a knife I know nothing better than a piece of a short, thick scythe, such as is used for cutting Bathurst burr. It should be passed through a cut in the wood in an open angle close to the back-end of the right-side piece. Do not let the knife protrude more than from 4 to 5 inches; otherwise it will drag the stuff along after it is cut.

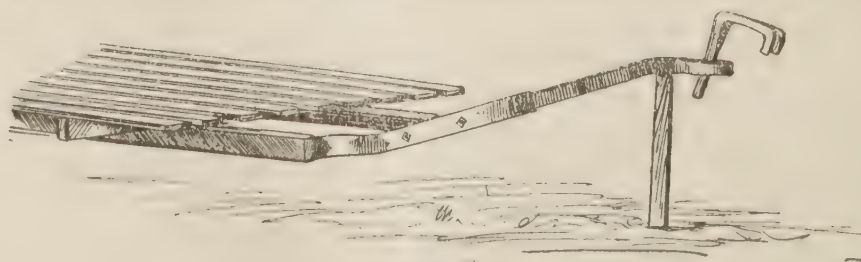
The *bender* is a bar of iron, $\frac{1}{2}$ -inch thick. Fix one end of it in a hole on the wood near the hinges, then bend it gradually upwards, outwards, and backwards until it is about 6 inches in front of the knife. Here pass it through the eye of another bar, $\frac{3}{4}$ -inch thick and 2 feet 6 inches high, firmly fixed in the wood, and then bend it gently for about 1 foot outwards, so that the bender forms also an open angle, similar to the angle formed by the knife with the wooden piece it is fixed on, but about 6 inches in front of it.



The bender is the main piece of the corn-cutter, without which the implement will never work well. As you see by the form of the bar, it performs two different works. It first lifts gently any cornstalk which might happen to be bent down and, above all, it bends slightly forwards and outwards all the stalks, which are then cut very easily and, so to say, nearly without any friction by the knife, which follows close after it.

Do not attempt to put on any more wheels. The machine is of easy draught; as it is, a light horse has no difficulty in working it the whole day. Neither should a second knife be put on the left side, for then the stalks will fall on the next row and get entangled with the standing crops. It will cut any sort of cane, sorghum, or maize sown in rows. The *Darling Downs Gazette* thus describes its work:—"It was engaged cutting Amber cane for ensilage at the time of our visit, and did its work excellently, cutting the thick stalks close to the ground and laying them down evenly. Its capabilities were very apparent, for the drays busily engaged drawing the cane were unable to keep anything like pace with the machine. As fast as the horse can walk will the machine cut and lay the crop," &c.

When the crop is well dried, it has now to be carted to the yard. For such a bulky crop the usual farm dray is unhandy. It is far too high, entailing a great waste of time and energy to lift the crop on to it. Neither is it spacious enough, even with the addition of the usual hay frame. To obviate these drawbacks the writer has devised and made, on the Experiment Farm, "rolling platforms" standing within a foot from the ground on two 12-inch wheels with broad tires, whilst the forepart is provided with an iron arrangement hanging on the middle of the axle of the dray. That work is made of very strong iron, 4 inches by $\frac{3}{4}$ -inch, bent nearly at right angle, and then welded or bolted to a







VIEWS AT WESTBROOK EXPERIMENT FARM,
Showing Corn Crib, Ensilage Stack, Columbian Harvester, and Tardent Rolling Platform attached to Dray

strong piece, 2 inches by 2 inches, 4 feet long, ending in an eye $1\frac{1}{2}$ inches in diameter. This eye is held by a key at the lower end of a double-forked hook, hanging on both sides of the centre-piece of any dray. Such an arrangement allows the dray to turn very short.

As to the platforms, they are 16 feet long by 8 feet wide. They are made of two bottom plates of hardwood, 3 inches by 4 inches, held together by six crosspieces, 2 inches by 3 inches. On these are nailed eight 6 by 1 inch boards. Two ropes (or clothes-lines), tied by their ends on the back of the platform, extend up to the dray under the load. These platforms being so low, they are, of course, very easy to load. The unloading is rendered still easier and quicker, thanks to the above two ropes. You stand on the dray, throw the ropes backwards over the load; then with a horse (usually the front horse of the team) you pull off the load, which slides back out of the platform in less time than it takes to describe it. I dare say that that simple but practical device has taken the fancy of every farmer who has seen it at work. These platforms are certainly handier than the much-talked-of American wagons, although they do not cost as many shillings as the former cost pounds. The fact that they can be used in conjunction with the dray allows full advantage to be taken of the horse's strength, which is, as is well known, greater in the dray harness. Ours are made to carry 2 tons, but we usually put on only 1 ton per load. They are used to carry any bulky stuff on the farm, such as hay, straw, wheat in sheaves or in bags, cornstalks, cowpeas, brush and fire wood, posts, &c.

To return to our crop, the cobbing is done by boys in the yard, whilst men take the sheaves and stack them.

To build the stack inexpensively, it is better to fix in the ground a strong mast from 25 to 30 feet high, then to add a boom about 20 feet long, held by a steel rope at the proper degree of horizontality. Now take three pulleys (the larger their diameter, say, from 12 to 18 inches, the easier will be the lifting), fix one at the end of the boom, one at the other end close to the mast, and the third one at the bottom of the mast. Now, run over them a strong hemp rope, and get it pulled by a horse driven by a boy. In that way one man on the ground and another on the stack can do a considerable amount of work in a day. The sheaves can be seized by a pair of those specially made pinchers, called dogs; but for stacking all kinds of stuff, except hay, I prefer using rope slings. They hold the load better, and can be used to drag it either on the ground or on the stack.

No doubt the hauling, stacking, and, later on, the chaffing of that cornstalk hay entail a good deal of labour and time. But both are well repaid by the value of the crop, the weight reaching up to 2 and 3 tons per acre.

In regard to the cobs, the best way to save them, especially in this country, where corn is so liable to be attacked by weevils, is to stack them in a *corncrib*. These corncribs should be found on every farm. They should be inexpensive, well-ventilated buildings, and so made as to be easily filled and easily emptied. At the Queensland Agricultural College, Gatton, there is a very handy one, mostly built, I believe, by the students themselves. It is so arranged that the cart can pass through the building, the corn being stored overhead and on both sides.* On the Experiment Farm of Westbrook we had a much simpler affair, after the type of those used for the purpose in America and in some of the corn-growing countries of South-eastern Europe.

The posts are placed crosswise, dog-legged fashion, with their lower part well buried in the ground. When the roof is put on, the space for the corn has a diamond-shape appearance. On the sides are nailed battens which allow the air to permeate everywhere, although the corn is perfectly well protected from rain. The storing space of that crib is 60 feet long and, if I remember rightly, 8 feet high by 11 feet wide, and can hold unhusked cobs enough to make eighty bags of threshed corn, or a little over 300 bushels. This, together

* This corncrib has lately been altered to the form of an ordinary barn.—Ed. Q.A.J.

with the husks and piths, forms a considerable weight, so that it is imperative to build the crib of very strong materials, and have all the pieces well braced together.

When the husks, grains, and piths are thoroughly dry, then is the time for husking, shelling, bagging, and marketing.

Who of us does not remember with a shudder the long, tedious hours spent at husking corn by hand. It is a work which is of necessity usually left to the weaker members of the family. It is none the less a very trying work indeed. The husks emit a tiny, very aggressive dust, most irritating to the throat, eyes, and skin. The stack seems so large! The work will never be finished. It drags along during the whole season to the great discomfort of the whole household. Who of us has not had then the criminal idea that dad's crop was too large, and wished there had been less of it.

Then comes the shelling, mostly done yet by the little hand corn-sheller. There is at least some movement in the work, some noise too; but it is none the less hard for the boys to turn the handle the whole day through, like Samson of old in the city of the Philistines.

Happily those can be at any time things of the past, thanks to the ingenuity of a Queenslander, Mr. Adam Rückert, of Broxbourne, near Pittsworth, the smart inventor of the Rückert's corn-husking, shelling, sorting, winnowing, cleaning, and bagging machine. I had the machine at work on the Experiment Farm, and had thus an opportunity of studying it and of judging of its work. From outside it looks very much like an ordinary wheat-threshing machine, with, of course, many alterations required to perform its work efficiently. The cobs are shovelled into a kind of shoot, and there elevated by an endless chain which throws them into a yawning mouth composed of fixed iron bars, and of a rapidly revolving pegdrum of a peculiar pattern, which forms the principal merit of the invention. The corn, perfectly clean, rapidly drops on the side into a bag in an uninterrupted golden streamlet, whilst the husks, piths, and rubbish are being thrown out elsewhere, each in its particular place. In that way from fifteen to twenty bags are turned out per hour, at a cost of from 4d. to 6d. per bag, or not exceeding $1\frac{1}{2}$ d. per bushel. The machine weighs only 15 cwt., and is being worked by a 3-horse power portable engine.

Before leaving the subject of harvesting, it should be mentioned that Professor Thompson, of New South Wales, advises taking off the cobs when quite green, then husking and curing them in the crib, whilst the yet green cornstalks can be at once cut and turned into ensilage! I had never an opportunity of trying it myself, so I do not take upon myself to recommend it. Still the eminent authority it comes from should make it worth while for every corn grower to give it a trial, were it only on a small scale. Should the corn turn out to be really as good as the one which has ripened on the stalks—which somehow seems doubtful—then corn growing would become one of the most profitable crops a farmer can grow. Not only would an acre of maize produce from 40 to 60 bushels of seed, but in addition from 8 to 12 tons of ensilage, which should be worth at least a similar weight of hay for feeding all farm animals. Why, with such a crop a farmer would grow rich in no time.

STORING AND MARKETING.

The safest way is, of course, to market the crops at once, when the thing is possible. But usually at that time there is a rush on the market, and prices run low. Besides, every farmer wants corn for his own use all the year through. It becomes therefore absolutely necessary to store it in some way. The best and cheapest way I know of is to store in air-tight iron tanks. It goes without saying that, in order to prevent the formation of mouldiness and decay, the corn should be thoroughly dry before being stored, which is usually the case when it has passed through the cornerib.

A piece of rag impregnated with a small quantity of bisulphide of carbon (bisulphide being both very poisonous and inflammable, keep both mouth and candle away from it), and put on top of the corn, will prevent all damage from

weevils and other pests. Should no bisulphide of carbon be procurable, there is a very simple substitute for it. Before soldering or puttying the tank *airtight*, put into it a burning candle. By its combustion the candle will use up in a few minutes all the oxygen of the tank and replace it by carbonic acid gas. The candle will die out, and the air in the tank will be unfit for any living being, including the dreaded weevils.

Should, as it has been suggested, wheat elevators be built along our railway lines, then I hope that some part at least of those useful institutions will be reserved for storing also maize in tanks. Then the farmer, who cannot afford to procure tanks—and others, too—could have their market maize safely stored for a nominal charge, and the *receipts* delivered to them by the officer in charge of the elevator would be as good as gold with any grocer or banker in the land.

In the past there have been great fluctuations of prices for corn, which we can roughly take to vary between 1s. and 6s. per bushel, according to the abundance or scarcity of the crop and other circumstances, too long to go into in this paper. I have no hesitation in saying that a farmer should never sell his corn at 1s. per bushel. Whenever he is offered less than 2s., which is little enough too, let him answer straight that his pig is a better customer. Let the pig have the pleasure of eating the corn, and then walk it straight into one of the now numerous bacon factories of Queensland; and, provided he is of a good breed, he will always get more than 2s. per bushel for the farmer's corn.

I would even go further and say: Let us use in our diet less meat, less flour, less groceries, and make a larger use of maize for ourselves and our families. Few people here have an idea of the extraordinary variety of dainty dishes which can be made of it, and what a healthy, nutritious food it is, too. We can already begin to use it when the kernels are yet in the milky stage or just beginning to condense. Break off the cobs, husk them clean, throw them into a pan of boiling water, boil for from twenty to thirty minutes, and serve hot.

We grown-up people, who have some decorum to observe, rub off the seeds with a knife and mix them on a plate with some salt and fresh butter. But children, and especially boys, have a simple way of their own which might well, perhaps, be the best. They put the finely-powdered salt direct on the cob, then follows the butter, which melts gently in coming into contact with the yet hot seeds. Then. . . . with one end of the cob in each hand, those boys start their work, biting straight into the cob, which they keep moving horizontally to and fro as if they were playing the mouth-organ. And it takes them a long time before they are tired of playing!

Maizemeal comes next. It has a great drawback. It does not keep well. It easily becomes bitter. Hence *pellagra* and other unpleasant diseases of the digestive organs complained of recently in this *Journal* by the editor himself. But now millers prepare it in towns nearly daily according to the demand, and for those who live in the country there is now cheap hand-mills, by means of which the quantity required by the family for, say, a week can be easily and cheaply prepared.

When thus fresh, the maizemeal can be used to make innumerable dishes. Amongst many other medical authorities, I have it from Dr. Fisher, one of the medical advisers of the combined friendly societies in Brisbane, that it is one of the best and healthiest of foods. The citizens of the United States of America are the greatest maize-eaters in the world. It could hardly be said that they are in any way a degenerated race. Has not the last war proved them to be for endurance and resistance to disease and fatigue equal to any other nation in the world?

I wish I could quote here some of the numerous recipes in use in my house, or contained in the writings of Professor Shelton or Dr. Cobb on the subject. The latter has, in the *New South Wales Farmers' Guide*, an admirable page on popping corn, a page which should be learnt by heart by every child in the colony. There are, of course, various ways of popping corn. It is first done by exposing on a fire the kernels placed in a hopper made of wire-netting

and provided with a wooden handle. It can also be done by throwing the kernels into boiling fat, a few at a time. They sink, but soon pop and come to the top. Popping can also be done in hot ashes. The writer has seen corn popped in Southern Russia by burying it in hot sand on the bottom of a saucepan. Whichever way the operation is done, the kernels come on top, pop, and burst, turning the inner part outside, which then looks quite white and puffy, and is sometimes twenty times as large as the original kernel.

It is surprising, says the good doctor, how much popped corn a man can eat. A peck is a moderate allowance.* Popped corn is easily digested, and children can have an unlimited supply of it.

Time and space at my disposal becoming short, I cannot say much on the different sorts of maize. They are innumerable, for maize is a plant easily crossed and adapting itself rapidly to new environments. In addition to the well-characterised sweet corn for boiling, pop corn for popping, we can divide the others into two principal well-defined classes—the round-seeded flinty maize, and the long flat horse-tooth-like seeded maize. The former (the flinty), of which the best types we have are the 90-day and the Early Yellow Flint, are usually hardy, early, and give the best flour. They withstand also best the attacks of weevils. Their seed is heavy, but there are proportionately less bushels or volumes to the acre. The cob, though of large size, contains a thick bulky pith, which reduces the volume of shelled corn. In that respect the horse-tooth-like varieties have the advantage. Their pith is usually thin, and the grain being long, flat, and close set, the number of bushels compared with the crop of cobs is very considerable indeed. Most of the members of this class are usually late corns, taking four and sometimes five months to ripen. An exception in that respect is the Little Early Yellow Dent, introduced a few years ago from America by the Department of Agriculture. It ripens as quickly as the 90-day, and stands the drought well. The Large American Dent, the Red Nibbed, and the recently introduced Golden King are, in addition to the above-mentioned Early Yellow Dent, amongst the best members of this class of corn.

There are many points yet in maize-growing, such as tasselling and topping, which are rather objectionable, and suckering, so largely practised in these colonies, although comparative experiments have proved it everywhere to be, to say the least, an unremunerative work. But cultivating, on the other hand, can hardly be overdone. Careful experiments have proved that by cultivation the crop can be increased from 10 to 50 per cent., according to the number of times (from 4 to 5) the cultivator does its work between the rows. But I abstain from entering into further details. I abstain also from quoting figures on the cost of production. The circumstances, such as soil, implements used, state of the roads, distance from railway and market, &c., vary so much in each individual case, that no two farmers would quote the same figures. But I will conclude this article with the following theses, which form, so to say, my present *credo* on maize-growing:—

1. Maize-growing by hand labour only is tedious, unpleasant, and unprofitable farming.
2. By the use of the above-described or other similar labour implements and rational use of labour, maize-growing becomes a pleasant and most profitable branch of farming.
3. When the price of maize falls below 2s. per bushel, it should be turned on the farm into bacon, eggs, and other concentrated products.
4. We, Australians, living in one of the best maize-growing countries in the world, should follow the example of our American cousins and make a far larger use of corn in our diet. It is a food equally acceptable to rich and poor, being no more out of place on the table of the king than on the plate of the humblest in the land.

* It should be remarked here that a *handful* of kernels will make a *peck* of popped corn.

Plate LXVI.**MAIZE FROM WESTBROOK EXPERIMENT FARM.**

ANOTHER GOOD VEGETABLE TO GROW IN QUEENSLAND.

By HENRY A. TARDENT,
Manager, Biggenden State Experiment Farm.

As has often been remarked, Queensland can produce such an extraordinary variety of flowers, vegetables, and economic plants of every description, that the immigrant from the north of Europe, or even from the south of our island continent, is at first somewhat bewildered. If he happens to be of a progressive turn of mind, he starts at once studying and using those new bounteous gifts of Providence. He does not get discouraged if a first attempt at growing or even tasting them is not quite up to what he expected, for taste as well as our other senses requires to be gradually educated. And in a short time such a settler—poor as he may be financially—has on his table such a supply of choicest meats, vegetables, drinks, fruits, and flowers that Lucullus himself could have envied him.

If, on the contrary, the new arrival is of a conservative, stubborn, inobservant turn of mind, he will pass indifferent those new things, and stick to a diet which was fitted, perhaps, for a cold climate, but which is quite unsuitable under our sunny skies. Thus it is that, for instance, in too many of our country hotels—there are, of course, exceptions--the traveller always finds an unvaried diet of uniformly prepared meat, three times a day, with perhaps here and there a potato or a dish of rough Chinese-grown cabbages, simply boiled in water without salt or any other condiment, and to complete the feast in front of him, there is a sickly-looking bouquet of dust-covered paper flowers. Many settlers are not better off, feeding themselves and their families with salt junk for two-thirds of the year.

It goes without saying that such a state of things is regrettable in many respects, whether it be due to ignorance or laziness. A rough diet has a greater influence on character than perhaps people are aware of. It engenders coarse manners, and not seldom coarse morals.

“Has ever a glutton uttered a noble thought?” says the poet.

With such a diet the stomach gets fatigued; it revolts against such excess of work; it craves for help, and rushes at the first opportunity towards the whisky bottle, causing thus those periodical “boozes” frequently met with in some people, whilst people using more vegetables and fruit are comparatively free from such cravings.

There is not only profit in growing fruits and vegetables; there is pleasure, good health, good humour—in short, full happiness. To use some of Mr. Wragge’s expressions, “A well-kept orchard is a poem; a vegetable garden a treatise on morals; a flower garden, a piece of Paradise on earth.”

To help those willing to learn, the writer has already given in former numbers short notices, not so much on the choicest vegetables as on those easiest to grow—such as the sweet potato, the tomato, the *Vigna catiung* bean or so-called “cow-peas,” &c. To-day he will try and give a few hints on the cultivation of the

GLOBE ARTICHOKE.

As far as could be ascertained from people visiting my own farm or the Experiment Farm, the plant is very little known. It has even happened that people—and well-educated people they were, too—have, whilst looking at my Globe Artichokes plot, complimented me on being able to grow, west of the Range, such beautiful pineapples—to which fruit in shape they bear a slight, a very slight, resemblance. It is also not seldom confounded in people’s mind with the Jerusalem Artichoke, with which it has nothing in common except the name. The plant of the Jerusalem Artichoke (*Helianthus tuberosus*) resembles in shape the sunflower, and is cultivated principally for its *tubers*, which grow in the soil on the roots of the plant somewhat like ordinary potatoes.

It is a very useful plant on the farm,* too, and we might have something to say about it some day. The Globe Artichoke (*Cynara scolymus*) is, properly speaking, a *thistle*, a domesticated thistle so improved by cultivation that the thick and circular bottoms of the flowers—*les fonds d'artichauts*, as the French call them—can be used in various ways as a most wholesome esculent. There is a considerable consumption of it in the southern countries of Europe, it being on the table, in one form or another, nearly every day of the year. For that purpose the heads, as the flowers are called, are cut off from the plants, and stripped of their fluffy cotton. They are then either used in the soup or boiled in salt water, and served as salads with olive oil and vinegar, or simply fried in butter. They make excellent pickles, and can be dried in the sun or in the evaporator for winter use. The rib-like sepals of the flower are also used, mostly boiled in salt water. You take them off then one by one, dip the lower end in a sort of sauce made of olive oil, vinegar, pepper, and mustard, and then . . . suck it. It is an excellent appetiser, and is greatly relished by connoisseurs, who not seldom pay high prices for them.

In Queensland the Globe Artichoke could easily be grown over the whole colony. It is mostly propagated by suckers, which grow in large numbers all round the stem. Those suckers are pulled off—not cut—usually coming off with a piece of the old stem (talon), which ensures a strike.

The most suitable land would be a rich and friable loam, or land made similar to such by cultivation and tillage. It should be either forked or subsoiled from 12 to 18 inches deep, and well mixed with horse or other manure. Good drainage is a necessity, be it natural or secured by artificial means.

The suckers should be planted in the spring directly after having been pulled off the old plant, in rows 4 feet apart each way. This allows the cultivator to pass in every direction, and saves labour. Keeping the weeds down and the soil well pulverised, never allowing it to form a crust, is about the only care the artichoke requires until harvest time, except, perhaps, one or two thorough soakings should the weather appear to be very dry at flowering time. As the heads get well formed, keep cutting them off regularly, and others will follow in succession during the whole season. In autumn take off more of the suckers, fork some manure into the land again, and then you are ready for another good crop the following season.

People living in remote places might have to grow artichokes from seeds to make a start. This is easy enough. Any reliable firm of seedsmen will furnish good seeds, which should be sown in beds of light soil from, say, July to September. Should the weather be hot and dry, it is well to put on the bed a light dressing of horse manure, to give a good sprinkling with tepid water, and shade the bed with branches, thatch, or a piece of calico. They can remain there till the following season, when they are transplanted in their proper places in the garden in the manner described above for the suckers. If the operation has been carefully done, they will bear fruit (or rather flowers) the same season.

HEMP.

WITH a soil and climate which, in many parts of Australia, are eminently suited to hemp cultivation, it seems strange that little or no attention is paid to it as a staple farm product. The Victorian Government gives a bonus of £5 per ton on hemp and flax manufactured in the colony. Up to April, 1898, only about £315 had been granted, showing that some 63 tons was all that had been produced, mainly in the Gippsland district. In South Australia hemp and flax have been cultivated with success in the southern parts of the colony. In New Zealand little attention is paid to any but the native flax. In Western Australia nothing is done to produce this valuable fibre. In its raw state hemp is worth about £43 per ton in the Melbourne market.

* We should not recommend anyone to grow the Jerusalem Artichoke on any valued land on the farm. See *Journal*, Vol. 11., p. 351, 1st May.—Ed. Q.A.J.

Hemp is the most remunerative of the agricultural products of Italy, partly on account of its own value, and partly because the large amount of residuary matter is subsequently of great value to the farmer. The Government statistics calculate the annual yield at 70,000 to 75,000 tons. That this calculation very much under-estimates the quantity grown seems tolerably certain, for the returns from the province of Emilia alone give us 40,000 tons; Naples and Caserta, 18,400; which would only leave 11,600 for the provinces of Bologna and Ferrara, which are notoriously the chief producers of the article. The hemp of Bologna is especially noted for the great length of its fibre, which is due to the unusual height (13 feet) to which the plant grows in that region. It possesses strong and tenacious properties.

SESAME.

THE *Sesamum* is a showy annual plant, indigenous to India, Japan, and China, and is grown in large quantities on enormous areas in those countries as well as in Africa and Brazil. It is one of the oil-producing plants. The oil is expressed from the seeds, and is of a straw colour, clear and sweet. It makes a good substitute for olive oil, and, unlike the latter, it will keep for years without becoming rancid. We mentioned in a previous number of the *Journal* that "Teel seed" was imported largely into England for the purpose of adulterating butter. The Sesame seed oil goes under the names of Gingelly, Til, or Teel oil. It is used largely in cookery, and the plant, its seeds, and leaves can be put to so many uses as to make it one of the most valuable oil-yielding plants of the world.

Mr. Lewis A. Bernays, in his work, "The Cultural Industries of Queensland," mentions it as such, and states that its cultivation is very simple. The seed is thinly sown in drills in spring, and the crop is harvested three months afterwards. It may be grown at high or low levels.

That the crop is suited to a dry climate is evidenced by the fact that in Bengal *Sesamum indicum* is sown in February, and the crop is got in in three months afterwards, so that the dews and the little remaining moisture in the earth are the only sources of humidity by which it can benefit, as this is generally a period of drought.

The plant sends up a four-cornered stalk from 2 to 4 feet high, with a few lateral branches. The long oval leaves are somewhat hairy and grow opposite. The stalks terminate in loose spikes of white or rose-coloured flowers, in shape like those of a foxglove. Apart altogether from its commercial value, it makes a charming garden plant.

The fruits are four-corned capsules, two-valved, about a quarter of an inch long.

The seeds are about the size of linseed. As soon as the seeds are ripe the stems are cut and sun-dried, and the seeds are threshed out in the ordinary manner adopted for rape and other seeds.

There is much difference in the colour of the oil, entirely due to the mode of preparation.

The seeds must undergo a cleaning process by being repeatedly washed in cold water, or by boiling them till the whole of the colouring matter is removed and they become white. After this they are dried in the sun, and oil of a very pale straw colour is obtained.

The yield of oil is very large, varying from 40 to 45 per cent. After the expression of the oil, the residuum is used as food for cattle.

The leaves soaked in a tumbler of cold water (if dried, in hot water) make a mucilaginous drink, excellent for bowel disorders in children. The fresh leaves also make good poultices. The market value varies from £25 to £48 per ton. The crop is easy to grow, and there is a ready market for the product.

A small quantity is now growing at the Queensland Agricultural College, and, should it succeed, it will prove a valuable experiment, as no rain has fallen since it was sown, and yet it looks remarkably succulent and healthy.

Dairying.

NOTES ON RECENT DAIRY RESEARCH.

By Dr. C. M. AIKMAN.

INVESTIGATIONS have recently been carried out by Professor F. C. Harrison, at the Ontario Agricultural College and Experiment Farm in America, on the number of germs contained by milk; and how this germ content is affected by various conditions, such as contamination from the fore-milk (the first milkings), from the animal and the milker, from the air, and from the use of improperly cleaned utensils. In each case the number of germs present, and the species to which they belonged, were determined; and the figures stated are those found to be present in a cubic centimetre ($\frac{1}{8}$ of an ounce). With regard to the number of organisms present in the milk, comparison was instituted between the milk produced on the College Farm, where the utmost precautions were taken towards minimising, as far as possible, the access or microbic life to the milk, with that sold in the nearest large town. In the case of the milk produced on the Experiment Station Farm, it was found that the number of bacteria present varied from 8,000 to 18,000 per cubic centimetre; while in the milk bought from the ordinary retailers in the town the numbers present ranged from a minimum of 121,000 to a maximum of 1,200,000 per cubic centimetre. It will thus be seen how striking is the difference in the germ content of milk produced where the utmost precautions as to cleanliness are exercised, as compared with that produced under ordinary conditions, and after it has been subjected to various careless processes of handling.

With regard to the number of germs present in the fore-milk, Professor Harrison found that in the first few streams of milk removed from the teats they varied from 18,000 to 54,000 per cubic centimetre; while the numbers present in the remainder of the milk amounted to only from 890 to 4,800 per cubic centimetre. These figures clearly demonstrate how important it is that the first few drops of milk from each teat should be milked into a separate receptacle and subsequently thrown away, and should on no account be mixed with the bulk of the milk.

The importance of wetting the flanks and udder of the cow before milking was also clearly shown in the experiments conducted by Professor Harrison. Comparisons of the numbers of germs present in the milk when the udder and flanks of the cow were wetted, as against those present when recourse was not had to such measures, were instituted. The test was carried out by counting the numbers of germs falling into a pail one foot in diameter, in a minute's time in each case. Where the cow was milked without wetting the flanks and udder, the numbers falling into the pail during the minute amounted to from 8,000 to 17,000 germs; while where the flanks and udder were moistened before the milking operation the numbers falling into the pail during a similar period of time only amounted to from 640 to 2,300.

Determinations of the numbers of germs in the air of the byre during the operations of feeding, bedding, cleaning up, &c., as compared with the number present in the air one hour after these operations had been made, were also carried out. In the case of the bedding operation, the numbers falling into a pail one foot in diameter during a minute's time amounted to from 12,000 to 42,000; while one hour later these numbers had decreased from a minimum of 483 to a maximum of 2,300. From a comparison of these figures, it is evident that much benefit would ensue from either moistening the fodder

before disturbing it, or else the operation of feeding should be carried out an hour, or even half an hour, before the process of milking takes place, so that the dust occasioned by the feeding and bedding arrangements may have time to settle before the milk is exposed to the germ life contained by the dust. In cases, also, where the manure is not regularly and completely cleaned out, it becomes dry and friable, with the result that small particles become detached from it, and float through the air, thus considerably increasing the number of organisms present in the air.—*Agricultural Gazette (London)*.

SOFT CHEESES.

LIVAROT CHEESE

IMMEDIATELY after milking, the milk is heated in large earthenware pans over a stove, very much in the way in which Devonshire cream is made, until the cream at the top becomes all wrinkled but not boiling; the pans are then moved, and left one or even two days, then skimmed, and the cream is utilised for butter.

The skim milk is heated to 104 degrees, and the rennet added, sufficient to coagulate the milk in one and a-half hours. Separated milk must never be used, or the cheese will be too crumbly.

The curd is now cut up and placed upon cloths or reed mats, and drains for a quarter of an hour; it is then again cut up into tiny morsels. It is then put into moulds of tin or wood, resembling those used for Camembert, and turned about eight or ten times the following day. The cheeses are now Fromages blancs (white cheeses), and are often sold in this state to the merchants, who finish the "affinage" in their own cellars. They are now salted all over, and are left upon an inclined shelf to continue draining for four or five days; after which they are taken to the haloirs or drying-rooms specially designed for these cheeses.

OTHER VARIETIES.

The cheeses made at Brie, in Seine et Marne, and round Coulommiers obtain good prices, and are quickly ready for market, but not having visited any of these dairies I cannot give details upon their manufacture, but I believe a few days could be very usefully employed in learning these methods, as Coulommiers is one of the cheeses which sells well in England.

There is another branch of cheese-making which involves more expense in plant than any of those previously named, but which could, I feel convinced, be most profitably taken up on some of our rich pasture land. The cheeses to which I refer are known as "fromages cuits" (baked cheeses). These cheeses are all of a soft consistency, but with a firm outer crust. Perhaps I am stretching a point in classing them amongst the soft cheeses, but still they are amongst those which can be put early on the market, and, being small, can be made where only a few cows are kept. The principal of these are Port du Salut, de la Providence; this is also known as Bricquebecque and de la Gautrais. These are all made much in the same manner—namely, by heating the milk in a large double cauldron, the interior vessel being made of copper, between which and the outer envelope either steam or hot water is introduced; a large quantity of rennet is added to the milk, and the curd is fit for use in half-an-hour; then the heat is increased, and the curd broken up by a wooden instrument into very small pieces. It is then left for a few minutes till the whey is separated from the curd; the whey is then drawn off quickly, and the curd put into moulds. These cheeses are pressed first very lightly, and then the weight is gradually increased.

After pressing they are salted, and this is one of the very important points in the making of these cheeses, and could only be learnt thoroughly from personally assisting at the work.

Curiously enough the two best of these cheeses are made in convents—the one at the Abbaye de la Trappe du Port du Salut, in Mayence; and the other at the Convent de la Providence, in the neighbourhood of Cherbourg.

I must not omit in this article a reference to the excellent cream cheeses and small sweet milk cheeses, known variously as Bondon, Neuchatel, Gervais, and Pommel. These are all manufactured in the town or the immediate neighbourhood of Gournay, in Neuchatel en Bray, but it is almost impossible to obtain an entrance into any of these large fabriques owing to the extreme jealousy of English imitation, and perhaps with good reason, as one may safely say that the Gervais, the imitation Pommel, and the cream cheeses now made at many of the English dairies are as good and as palatable as those produced in France.—*Agricultural Gazette (London)*.

FEEDING CALVES.

THE calves are taken from their mothers as soon as they are born, and our system of feeding is as follows:—

First week—Feed three times a day with own mother's milk in moderate quantity at blood heat; a pint four times on the first day, rapidly increasing each day to two quarts three times a day on the fourth or fifth day.

Second week—Two quarts of new milk, warm, three times a day.

Third week—Two quarts of warm milk (half new and half separated) three times a day, with half a pint of linseed soup to each quart of separated or skim milk.

Fourth week—Ditto, with a handful of sweet meadow hay twice a day to pick at.

Fifth week—Two and a-half quarts of warm skim milk (no new) three times a day, with half a pint of linseed soup to each quart, and sweet meadow hay after morning and evening meals; to be continued till the end of the eighth week, with gradually increasing quantities of hay. *Note*.—We find that a calf who takes to hay well requires little more than separated milk besides to rear it satisfactorily.

Ninth week—Omit linseed soup, and after the midday milk give about half a single handful of linseed cake broken small and a little pulped swedes. To spring calves cut grass may be given instead of turnips, and gradually be made to take the place of hay until they are turned out on pasture.—*Farmer and Stockbreeder (London)*.

Viticulture.

VITICULTURE IN THE FAR NORTH.

MR. E. H. RAINFORD, Government Viticulturist, who has lately been visiting the various agricultural centres of the Northern portion of the colony, has furnished to the Minister for Agriculture the following very interesting and exhaustive report on the climate, soils, and capabilities of the different localities examined by him, with a view to deciding and reporting on their adaptability or otherwise for grape-growing:—

HERBERTON.

SOIL.—The soils of the Herberton district are—

1. A light-coloured sandy, friable soil, formed by the decomposition of porphyry and granite.
2. Red soils of various shades of volcanic origin.
3. Soil formed of the *débris* of limestone.

All the above are apparently well drained, which is a favourable point in viticulture. The first and third would be the best adapted for the vine, provided that situations were chosen where the slope is not too great to avoid washing away of the soil by heavy rains. In the immediate neighbourhood of Herberton the soil is apparently too poor and shallow, and the country too precipitous, to promise good results in vine cultivation; but in the district there are many places where the soil is of sufficient depth and quality for the vine to flourish.

The red soil of basaltic origin is not much recommended, especially that of a bright-red colour, as this kind of soil has almost invariably proved unsympathetic to the vine in all parts of the colony, either from a superabundance of ferrous oxide or a deficiency of lime and soluble potash. In those places where the granitic and basaltic formations are in contact and the resultant soil is of mixed character, the vine should do very well indeed. Where the vine is planted in red volcanic soil, the latter would be improved by the application of quicklime or bonedust.

CLIMATE.—The climate may be compared, so far as viticulture is concerned, to the coastal districts of the Southern part of the colony, the winter being sufficiently marked to give a period of repose to the vine, which is not the case in some places in the North. There is also less atmospheric humidity. As in other parts of the colony, there is frequently serious loss of grapes by rotting in those years when the rain arrives sooner than usual. To avoid this, it would be well to plant the earlier ripening varieties of American grapes, which are also very resistant to fungus disease. European kinds are not indicated for this district.

REMARKS.—There would appear to be an opening for the cultivation of table grapes on a small scale, as prices obtained are remunerative, but with at present a limited market. Viticulture for wine-making purposes would also be profitable, provided the proper varieties of vines were chosen. The porphyritic, granitic, and limestone soils should be preferred, care being taken to avoid slopes where heavy rains would be likely to wash down the soil. On the poorer granitic soil manuring would be required at intervals; farmyard or stable manure, bonedust, and green crops are indicated. Where the vines are planted in volcanic soils, some form of lime is required as a fertiliser.

The vines indicated for table purposes are—Wilder, Goethe, Elvira, Rulander, Iona, &c.

For wine-making—Jacquez or Lenoir, Black July, Catawba, Othello, and Espar.

ATHERTON.

SOIL.—The soil around Atherton is principally red volcanic scrub soil derived from the decomposition of a basaltic formation, and the same remarks apply to this district as have been made upon the volcanic soil of Herberton. The hills, however, are of granitic sandstone rocks, too steep for any cultivation, but at the foot of these ridges there are spots where the soil is deep and of a sandy loamy character, where the vine would do well. In some places the volcanic and sandy soils mingle, and would prove very favourable for viticulture.

CLIMATE.—The climate is very similar to that of Herberton, and the vines indicated for that district would do for Atherton.

REMARKS.—Although at present the cultivation of the vine is very limited in this district, principally for want of a market and of facilities for transport, there appears to be a probability of a change for the better taking place in the immediate future in these respects. If so, there can be no doubt that both here and at Herberton a fair quality and early table grape can be grown which would find a remunerative sale in the mining centres.

CAIRNS.

This district is entirely unsuitable for viticulture; nor, so far as was to be observed, is there any attempt made to grow grapes.

TOWNSVILLE.

SOIL.—The soil around Townsville is patchy and of variable quality. At the foot of the hills is found a good soil—deep, more or less sandy in character, and therefore well drained, and on the whole suitable for viticulture. In the plains there are large tracts of ground too clayey in character to permit vines to be grown successfully, but with patches here and there of loamy soil, on which the vine would do fairly well. Along the banks of the River Ross are patches of alluvial, likewise adapted for viticulture.

CLIMATE.—The great drawback to grape culture in this district is the climate, which practically allows the vine no repose; before the vine has well finished one season's vegetation, another has started. The vine has no time to recuperate its strength, and resembles a man working twenty-three hours out of the twenty-four, and the consequence is but little fruit, and that of poor quality. Nor is it possible to indicate a way of overcoming this difficulty; the only suggestions I can make that might modify the evil a little are to plant the vine deep and remove surface-roots, to prevent, as far as possible, the vine being influenced by variations of temperature during the winter; to prune closely and restrict the growth to comparatively few canes. These will grow inordinately, but will have in all probability fertile eyes for next season's growth. Those vines left with too many spurs will, in consequence of exhaustion, have infertile eyes. Some trials in pruning vines on the long-rod system might prove servicable in mitigating the infertility of the vine. The system is explained on p. 464 of the *Agricultural Journal* for June, 1898. Those eyes on the fruit-branch which prove infertile and show no bunches when they burst may be suppressed so as to take off some of the strain on the vine; but on no account must the shoots which are intended for next year's wood be suppressed. The humidity of the climate has the effect also of promoting the growth of fungus disease, but apparently not more so than in other coastal districts further south, where viticulture has proved fairly successful.

REMARKS.—The climate is the great enemy to grape culture in this district, and under its influence the vine will prove but a partial success. The want of sufficient repose and the humidity of the climate must seriously affect its fertility. The most useful vines for this district would be the better quality of American vines, which are disease proof. Some European varieties appear to do well, except for the small crop they give. The American vines recommended are—Wilder, Goethe, Elvira, Iona, &c. The European varieties recommended are—Royal Ascot, Lady Downe, Almeria, White Syrian, &c.

All European varieties should be periodically sulphured with finely powdered sulphur. If the fungus attack is obstinate, wash the vines in the winter with a 10 per cent. solution of sulphuric acid, but the only hope of raising the finer European varieties is in constant attention to the use of sulphur as a preventive. If neglected until the disease has appeared, it will be powerless to combat the evil, which will have gained too much hold.

CHARTERS TOWERS.

SOIL.—The soil in this district is very varied, arising from the decomposition of granite, porphyry, quartz, slate, diorite, and limestone formations. For the most part it is sandy or loamy with a subsoil of rotten clay mixed with quartz particles. Patches of sticky black soil, similar to that on the Downs, are to be found. Where the soil is sufficiently deep and not too sandy, with a well-drained clayey subsoil, the vine can be cultivated with advantage. In all parts of the district isolated vines are to be found growing vigorously, showing that a suitable soil for viticulture is to be found in patches.

CLIMATE.—The climate is favourable to viticulture, inasmuch as it is drier than on the coast, and consequently there is, I am told, very little disease in the vines either in the shape of oidium or anthracnose. Such varieties as the Muscats and Black Hamburg, which are most susceptible to disease in

other parts of the colony, appear to be immune or only slightly attacked. This district suffers in common with others in the North from having too short a winter, and the vine in consequence has not sufficient repose to enable it to recuperate and crop well; although in this respect Charters Towers is better off than some places. The long period during which the vine is in vegetation each season has the effect of producing infertility. In some cases I observed vines, which are all short pruned in this district, with a poor crop, although with a strong vegetation. Some trials with long-rod pruning are advisable with these varieties, as it might materially increase the fruitfulness of the vine.

REMARKS.—In all parts of this district isolated vines are to be found showing vigorous and healthy vegetation, especially if manure has been applied. Two vineyards exist, distant a mile or two from the town, and both are well cultivated and luxuriant. That belonging to Dr. Birmingham, under the management of Mr. James, of South Australia, can compare favourably with any vineyard in the colony for choice of varieties and knowledge and care shown in the cultivation, and should be an object lesson to those interested in vine cultivation in the district. The climate, except for the shortness of the winter, is favourable to viticulture; the comparative dryness of the atmosphere for the best part of the year allowing the finest quality of European vines to be grown successfully. Fungus disease is exceptional, nevertheless I strongly recommend vignerons to dust their vines periodically with finely-powdered sulphur to keep off the oidium, as experience has shown that, although a district may be immune for some time, sooner or later these fungus diseases appear, and once having obtained a hold they are difficult to eradicate. Oidium is the most difficult to combat, and should be provided against by the use of sulphur as a preventive. A few shillings a year is all the cost for a vineyard.

All varieties of grapes, European and American, can apparently be grown here successfully. Instead of the inevitable Isabella round the veranda and over the porch, here are found such grapes as Royal Ascot, Lady Downe, Chasselas, &c., healthy and vigorous, a sufficient proof that all or nearly all the choice European varieties could be cultivated successfully.

BOWEN.

SOIL.—The soils of this district are principally of granitic origin, but on either side of the River Don are large tracts of alluvial deposits, deep and of great fertility. The soils of granitic origin comprise granitic sand and loams of a poorer description, with a subsoil at varying depths of clay more or less impervious to water, according as the clay is mixed with sand in greater or less quantity. As a rule, this class of soil drains badly, and is unsuited to viticulture, but in places the granite *débris* or loamy soil is of a sufficient depth to permit of the vine being cultivated, but care should be observed before planting vines in these soils to examine the clay subsoil to see if it drains well, and, if not, that it is at a sufficient depth not to cause root rot.

But the soil best indicated for viticulture is the black alluvial found along the Don; it is fertile, well drained, deep, easily worked, and of considerable extent. The fine citrus orchards which exist on these deposits testify to the excellent quality of this soil.

CLIMATE.—The climate for a coastal district is dry, whether from a comparatively small rainfall distributed over a short period with a consequently lengthy dry season, or from some other cause connected with its position and surroundings, I am not in a position to say. As a consequence of this dryness of climate, there is little or no fungus disease of the vine. I did not perceive a single instance of oidium or black spot on any of the vines examined. This is a point of considerable importance to the vigneron; it enables him to raise in the North of the colony European varieties of grapes which have been abandoned in districts further south in consequence of persistent attacks of fungus disease, due to a great extent to atmospheric humidity, but partly also to want of care in neglecting the use of preventives.

REMARKS.—There is an abundance of soil of the most favourable description for the cultivation of table grapes, and a sufficiently dry climate for the vines to be free of fungus disease, if ordinary care is taken to prevent its introduction and propagation in the vineyard; but the great drawback, as elsewhere in the North, is the shortness of the winter, and the consequent short time given to the vine to repose and recuperate, with the result that its cropping power is seriously impaired, a vine which should give twenty bunches of grapes yielding only three or four. This defect may possibly be modified by correct pruning, which throughout the district is extremely rudimentary. By confining the vegetation of the vine to comparatively few spurs, there is more chance of the canes being fertile than under the present system; but under no circumstances can vigneron hope for the crops which vines produce in the South. Here, as elsewhere in the North, vigneron should prefer the earlier ripening varieties of both European and American grapes, of which the following is a short list:—

European—Black, Cluster, Chasselas, Red Muscat, Almeria, Blue Portugal, Dolcetto, Madeleine Angevine, Madeleine Royale.
American—Canada, Wilder, Elvira.

MACKAY.

SOIL.—The soils about Mackay consist of a black alluvial of varying depth and considerable fertility with a subsoil of clay, more or less impervious to water; a lighter-coloured alluvial of a more loamy character with a similar subsoil; and on the north side of the river a fair extent of ridges of alluvial resting on clay mixed with sand, and in some places ridges of a schistose or slatey rock broken and decomposed. On these ridges the vine does much better than on the flats; and if care be taken in the choice of the ground, it should do well. Generally speaking, the summit of the ridges should be avoided. The alluvial flats, also, should be avoided for viticulture, unless the subsoil is known to be porous, or the vigneron is prepared to drain the soil artificially. In the latter case, the drains must be of sufficient depth, as anything superficial will be time and money lost.

CLIMATE.—The climate of Mackay is not so favourable to viticulture as that of some Northern districts, principally owing to the much greater rainfall and consequently greater atmospheric humidity. From this arises a certain amount of fungus disease of the vines, but not so severe but that it could be kept under with ordinary care. The more delicate European vines would, however, be more or less a prey to it, and cause the vigneron trouble and anxiety. As in other parts of the North, the same evil effects of too short a winter are noticeable here in exhaustion of the vine, and, in consequence, poor crops.

REMARKS.—Taking into consideration the quality of the soil generally and the climatic conditions of Mackay, vigneron are advised, if planting any quantity of grapes, to keep to American varieties, such as Jacquez or Lenoir, Wilder, Canada, Elvira, &c. If, on the other hand, a few vines are planted for household purposes, the hardier varieties of European vines may be chosen—viz., Almeria, White Syrian, Royal Ascot, Black Cluster, &c. The same remarks apply to the district round Eton as have been given above.

NEBO.

SOIL.—From Eton to Nebo the road passes through land of very poor quality, the soil generally being ill-adapted to agriculture until within a mile of the township, when it undergoes a marked improvement. The soil round Nebo may be practically divided into two kinds—a loam mixed with a little clay, but porous and well drained, and black soil more or less sticky in nature. The former, in places, is found of considerable depth, and is admirably adapted for viticulture. On both sides of Nebo Creek it is from 30 to 40 feet in depth, gradually decreasing as it recedes from the creek, until it ceases at from

one-half to one mile distance. A similar soil crops out of the black soil in some places in the shape of ridges of some extent. There would appear to be many thousands of acres of this class of soil available for viticulture or other kinds of fruit culture. The black soil is, generally speaking, too sticky for the vine, as there would be considerable difficulty experienced in keeping the land clean during the wet season; but in some places, as at Mr. Goode's vineyard, there is found close to the surface a subsoil many feet deep of limestone, apparently the *débris* of a coral formation, which being worked up with the black soil considerably reduces its tenacity and mellows it.

CLIMATE.—The climate of this district is favourable to viticulture; the rainfall is small (32 inches), and the air dry and bracing. In addition there is a winter of not less than three months' duration, with frequent severe frosts. The vine consequently is able to repose and recuperate for the coming season. The rains arriving about the same time as on the coast, would necessitate the choice of early-ripening varieties to avoid rot by the wet.

REMARKS.—The soil and climate of this district are favourable to viticulture, either for raising table grapes or for wine-making purposes. Wherever the limestone subsoil exists, the locality would be especially indicated for wine-making. Experience has shown in all parts of the world that a limestone soil has a great influence on the quality of the wine produced on it. Mr. Goode's vineyard is on a limestone soil; and the wine made by him, although far too sweet to enable one to judge its qualities accurately, showed a *finesse* of character promising a fine quality of dry wine in this district, if made pure and on scientific principles from a few well-chosen varieties of vines. I feel convinced that a wine of considerable merit could be made here; it would probably be of a claret or Burgundy type, not too heavy and possessed of bouquet and *finesse* if properly made and handled. An experiment in this direction with some of Mr. Goode's grapes would be of interest. The vines recommended for wine-making are Mataro or Espar, Black Cluster, Hermitage, Gamay, a few Lenoir, Sweetwater, Verdeilho. A crop of two tons to the acre, or 450 gallons of wine, may be expected if the crop escapes rot from wet weather.

For table purposes, all European varieties may be planted, but, notwithstanding the dryness of the climate and freedom from fungus disease, sulphuring vines should not be neglected.

CONCLUSIONS.

From what I have seen during my extended tour through the North, I feel assured that viticulture can, in many places, be engaged in successfully and profitably. It is a mistaken idea existing in the South that no grapes can be grown in the North of the colony. On the coast, it is true, vigneron are not too successful, as they labour under many disadvantages, the principal being the want of a winter in the real sense of the word. The vine, vegetating until late in the autumn, has but little energy when the spring arrives to commence fresh growth, with the natural result of poor crops and unequal ripening. The latter defect may be due, to some extent, to the variety of vine planted, such as the Isabella, which is notorious for this defect. A mistaken system of pruning is also accountable for some of the trouble; too many spurs by far are allowed. More vigorous pruning may possibly assist in more equal ripening. On the other hand, there is a marked freedom, at present, from fungus disease, which is a matter of considerable importance. Some varieties of grapes are grown free of oidium at Townsville and Bowen which have had to be entirely abandoned at Maryborough and in districts further south. But if the Northern vines are comparatively free from disease now, vigneron must not delude themselves with the belief that they will always be so, if they continue to neglect, as they do, the use of precautionary measures against its attacks. Its introduction and acclimatisation are only a question of time, and bitterly will they subsequently repent their present apathy. I cannot too strongly urge

upon vinegrowers throughout the North the absolute necessity of providing against this evil if they wish to continue to grow delicate European varieties, such as the Chasselas, the Muscats, Black Hamburg, &c. At present these vines are healthy, and bear clean fruit free of disease. In a few years' time, they will be killed by the oidium. The remedy is so cheap and simple that there is no excuse for neglecting it—a little finely-powdered sulphur dredged out of a flour-dredger or coarse canvas bag over the young shoots and berries, and the thing is done. Vignerons must not deceive themselves with the idea that because it has not appeared up to the present, or only slightly, that it will not do so. Fruitgrowers laboured under the same mistake with regard to scale and other fruit pests, and neglected their orchards, with the result that they are now combating the pests day and night at considerable expense, and yet are unable to free their trees, which would have been kept clean by an occasional spraying at first. Let the Northern vignerons bear this in mind, and take time by the forelock.

If, however, on the coast the vine is handicapped by the climate, such is not the case, or at least it is so to a much less extent, where the range has been passed. Here there is a positive winter of sufficient duration to give the vine that repose necessary to enable it to give a fair crop every season. At Charters Towers the vines were promising a fair weight of grapes, and at Nebo the average may be calculated at 2 tons to the acre. In all inland places the vines were healthy and luxuriant. There is every reason to believe that a belt of country stretching from north to south behind the range contains many similar spots favourable to viticulture on which a selector could raise table grapes if within easy distance of markets, or failing these for making wine, which should find a ready sale.

CELLAR WORK.

PREPARATION OF CASKS AND VATS.

By E. H. RAINFORD,
Viticulturist.

ALTHOUGH the vintage is still some way off, it will not be inopportune to write now a few words on the preparation of the casks, vats, &c., which may be required for the new crop, as later on other and more important matters will have to be dealt with which should appear on the eve of the vintage.

Too much attention cannot be given by vignerons to the preparation of casks, both old and new, as some people are apparently quite unsuspecting of the very prejudicial effect produced on the quality of a wine or must when it is put into casks which are not perfectly sound and sweet. Not only may germs of corruption and acetification be sown in the new wine, but aftertastes may be communicated to it which it is most difficult, if not impossible, to subsequently remove. Many a fine wine has been ruined by being made in an improperly prepared cask which has communicated to it mouldiness, taste of lees, woodiness, &c. In view of these dangers, a little trouble in preparing casks which may not be beyond suspicion is well employed, and may be the saving of a cask of wine.

If a cask has been recently emptied of wine, and has a good fragrant smell without suspicion of acidity or mould, it requires nothing being done to it, and may be used straight away. If, on the contrary, the cask has not been used for some time, and has been stored in a damp place, it may be defective and require any of the following treatments.

MOULDINESS.

This is one of the worst defects, and the most difficult to get rid of. The following is a good method of doing so :—

Pour into the cask a bucket of boiling water, and afterwards pour in carefully 4 lb. of sulphuric acid, bung tightly, and roll the cask about so that the solution scalds all points of the interior. Repeat at intervals the rolling. After a couple of hours of this work empty out the acid where it will do no harm, and well rinse the cask with cold water, empty, and drain. Then pour in two buckets of water and 4 lb. of bone black, roll about as before for a few hours, empty out, wash well with clean water, drain, and match with a sulphur match.

Another way if the mould is bad, and does not go with the above procedure, is to put into the cask—

- 2 oz. common salt
- 1 oz. peroxide of manganese, powdered
- 2 oz. sulphuric acid
- 1 qt. boiling water.

The bung must be tightly closed, the cask rolled a little to mix the ingredients, and left for three hours; then empty and wash repeatedly with clean water till all smell has left it. The above amounts are for quarter-casks and hogsheads; for larger sizes, increase the quantities in proportion.

To know if the mouldiness has left the cask, pour into it a couple of quarts of sound wine, and roll about at intervals for a day or two; then taste the wine. This test is good for the cure of other defects.

TO REMOVE OTHER TAINTS.

When a cask from which the lees have not been entirely removed has been empty some time, it acquires a disagreeable smell of dried lees; or sometimes, even if properly cleaned out, the crust of tartar on the interior surface will, from damp or other causes, decompose, giving rise to a similar taint, which would be communicated to the wine if not removed. To do so, proceed as follows :—First work the cask a bit with the chain and a gallon or two of water, to break up and remove all adherent deposits from the inside, and well wash with clean water. Wash a second time with a milk made of 6 gallons of water and 4 lb. of quicklime. A few hours after, rinse with clean water till it comes out clear; drain well, and rinse with 2 quarts of wine or a little spirit of wine; if with wine, light a match afterwards.

ANOTHER RECEIPT.

Use the chain as before, and wash out with one gallon of boiling water mixed with 3 oz. of bisulphite of lime. After draining as dry as possible, rinse with wine or spirit. A third method is—After chaining, wash with two quarts of water mixed with 4 oz. of sulphuric acid, putting the water in first.

After well rolling at intervals for a day, empty and rinse.

Then put in a couple of quarts of the above milk of lime and roll about. Rinse plentifully with clean water and drain well, then rinse with wine or spirit.

CASKS THAT HAVE CONTAINED RUM OR WHISKY.

Casks that have stored these spirits will infallibly infect a wine with these flavours, unless such taint be first removed. The best way is by repeatedly washing out with boiling water until the smell disappears, then match well.

SOUR OR VINEGARY CASKS.

This trouble is pretty frequent, and, unless *all* the sourness be removed from the wood, it will infect the wine or must put into it with the germs of acetification. Superficial treatment is useless—the disinfection must be

thorough. A simple washing out will apparently remove the sour smell which, however, will reappear very soon, as only the surface of the wood has been touched and not the interior.

Proceed as follows:—Dissolve 2 lb. of soda crystals in 2 gallons of boiling water, and pour the hot solution into the cask, which is rolled about and then left standing on the heads for several days until the soda has well penetrated into the wood, after which the soda solution is emptied out and the acetate of soda removed by a couple of gallons of boiling water, acting in the same way as with the soda solution. The boiling-water process must be repeated two or three times, after which the cask is well sulphured and is ready for wine or must. The above quantity of soda is for a 60-gallon cask.

ANOTHER METHOD.

Put into the cask a milk made of 2 lb. of quicklime to 2 gallons of water for every 20 gallons of capacity. Rinse well round the cask and let it stand for a few days, renewing the rinsing at intervals. Wash out with clean cold water until all the lime is removed, then match.

TO DISCOLOUR CASKS THAT HAVE CONTAINED RED WINE TO ENABLE THEM TO BE USED FOR WHITE.

Casks which have contained red wine for any length of time cannot be used for storing white wines, to which they would communicate a red tint from the colouring matter deposited on the wood, unless first prepared. As vigneronns are often short of storage, and are compelled to use a cask having contained red wine for white, it may be useful to them to know how to remove the colouring matter. Rinse the cask with hot water and drain, then put into it 2 lb. of powdered quicklime, and roll the cask well in order that the lime may stick to all parts of the interior. Then pour in a little water and roll as before. The slaking of the lime on the surface of the wood decomposes the colouring matter. Afterwards rinse several times with clean water and sulphur.

ANOTHER RECEIPT.

Six pounds of soda crystal are to be dissolved in 4 gallons of boiling water. Pour the hot solution into the cask, rolling and working the latter, so that no part of it escapes the action of the soda. Repeat the rolling at intervals of half-an-hour three or four times. Then empty and rinse, first with boiling water, then with cold, and well sulphur. This treatment also removes all the colouring matter, but unless the cask is thoroughly rinsed afterwards the wood is liable to remain browned, which will darken the wine put into it. The former receipt is to be preferred.

PREPARATION OF NEW CASKS.

This is an important matter, and is often improperly done, with the result that the wine first put into such casks is spoiled. The following is a good way to prepare them:—If the casks have been burnt inside in the manufacture they must be first chained with cold water to remove all charcoal, which would affect the colour of the wine. Fill the casks (if not too large) with sea water, or fresh water with salt added to resemble sea water, or fresh water to which 1 lb. of sulphuric acid has been added to each 100 gallons. The casks are to stand full for four days, then to be emptied, refilled, and again emptied after four days. Pour 2 gallons of boiling water into the cask for every 100 gallons of capacity. Roll well until the water is cold, and then empty. For each 100 gallons of capacity, heat over a fire 1 gallon of sound wine until it simmers, pour quickly into the cask, bung tightly, and roll about at intervals for a day or two until the spirit has been absorbed by the wood. Drain out to the last drop of the spent wine, and repeat the hot-wine process, rolling at intervals for some days; then empty and match the cask, and it will

be fit to send wine across the world without danger. If the vigneron has a still, the second dose of hot wine may be omitted, and a quart of spirit used instead, but in that case do not match. The writer used the above process for upwards of twenty years with success. If the cask is too large to be filled and rolled, use a smaller amount of more concentrated solutions, constantly washing the interior with a broom through the manhole to extract as much as possible the colour and bitterness from the wood.

REMARKS.

Various recipes have been given for curing casks of defects, but where sulphuric acid is given the writer from personal experience recommends it. It draws taint from wood wonderfully, and is very antiseptic. It is nasty stuff to handle, but with ordinary care no harm should happen. Be careful to wipe the drip off the bottle when it is poured out, and the clothes will then not be burnt. Where steam can be used instead of hot water, it is preferable, but few vignerons have the apparatus for this purpose. Where casks or vats are too large to admit of the use of the chain to remove dried lees or tartar, they must be scraped as clean as possible.

When casks are very slack from being empty a long time, do not drive up the hoops as tight as possible, for this procedure is the cause of much damage to the casks and occasionally the loss of all the wine in it. When wine or must is put into a dry cask that has had its hoops driven hard up, the wood, swelling by absorption of the liquid, puts such an enormous strain on the hoops that either the staves bulge inwards or outwards or the hoops fly, and a cask of wine is lost. In the majority of cases where the heads of casks are seen to bulge inwards or outwards, it has been caused by an over-tightening of the hoops. Instead of this, the hoops should be tightened only just sufficiently to allow the cask to be handled without falling to pieces. Pour into it a little boiling water and rinse it round. It will probably all run out in a minute or two, but continue the boiling water until the staves have swelled sufficiently to hold liquid, and then you can put in your must or wine and be guaranteed against flying hoops and bulging staves, as, when they swell with the moisture, no extraordinary strain is brought upon the hoops.

Apiculture.

AN APIARY FOR WAX ALONE.

IN Jamaica it would seem that beekeepers do not all run their apiaries for honey and wax combined, but some for wax alone. In reply to a correspondent, the journal of the Jamaica Agricultural Society says:—When the combs are out (in the supers) to the full size of the frames, cut them out, extract the honey, and melt the comb into wax. In cutting out the combs, leave about an inch of comb below the comb-guide at the top bar for the bees to begin on again, and repeat as above described as often as the combs are built. As soon as the honey flow is over, feed back to the bees all the extracted honey. More wax would be digested by the bees to build comb to contain the honey fed back, and again the combs could be cut out and melted. It would be a very interesting experiment to try with a few colonies how many pounds of wax one good colony could produce.

In the next number of the same journal another writer recommends the following:—Select two hives (meaning two to work together—100 as 50, and so on) which we will call Nos. 1 and 2. Put a super with, of course, a sheet of excluder on No. 1. Then take combs (leaving one for queen) from No. 2 and put them in the super, filling the hive with frames having a strip of comb-foundation, or starter. Let the combs remain just long enough for the young

bees to hatch. Then take out the frames, cutting off the comb to within an inch of top bar. Remove the super to No. 2. Take out combs from No. 1; put them as before in the super, putting in the frames from which the comb was cut off in No. 1. As soon as the young bees are hatched, take out the frames and do as at first, removing the super alternately as above described, taking care to see that the bees are always fed back the honey taken from them (remembering it takes over 12 lb. of honey to make 1 lb. of wax), and for bees to be kept always making wax is a very great strain on their strength. The person in charge must watch and not leave any comb in the super directly the young are out, as it only wastes time.

STARTING AN APIARY.

BEE-KEEPING is undoubtedly a very pleasant and we wish we could add a very profitable occupation, and no doubt many handsome cheques have been realised by scientific bee-farming.

All bee-keepers know how difficult it is to effect sales of Australian honey in the world's market—London. Either our honey is too light or too dark; it does not set well or it sets too much. If it does not reek with the odour of Eucalyptus, it has some other odour, or there is a bouquet wanting in it. In fact, no matter how good the sample exported from the colony, the home buyer will discover such a host of imperfections in it that he considers 15s. to 16s. per cwt. a ruinous price for it.

Some people have the same idea as Eugene Secor's Dutchman, who sang—

Oh! I ish von of dose happy bee mans,
I don't got to vork any more.
I loaf all day in the apple tree shade,
Or schmokes mine pipe at der door.

Now, those who are in the business here know that it is not all "bee (r) and skittles." To make a living out of the busy bee, a man must thoroughly understand the business, and must devote his whole time to it. We say nothing about the man who keeps three or four hives in his garden or orchard for the purpose of getting a little honey and wax for domestic use, and perhaps a little for sale. His living does not depend on them, and if he neglects them he is at no serious loss.

But where a living is desired to be made out of the bees alone, we would not exactly say to the aspiring bee-master, "Don't," but we would warn him to hurry slowly—*festina lente* is a good motto to bear in mind when bee-keeping is in question. There are the usual thousand-and-one vexations and annoyances connected with this industry as with poultry-farming.

The unexpected is constantly happening. Even supposing an apiarist to be very successful—suppose him to have a hundred strong colonies at work—working for him like Gilead P. Beck's Golden Butterfly—what then? He turns out, perhaps, three tons of honey in the year, which will probably realise, including the wax, under £100, at the prices now offering in the London market for Queensland honey. Against this gross return has to be set the annual expense in the shape of labour, implements, tins or jars, railways freights, commissions, &c., &c., which take away much of the profit, if not all. Combined with other rural pursuits, the produce of the apiary will naturally add to the farmer's income, but prices must change very much for the better if even a bare living is to be made out of it. It is very much the same with honey-producing as with silk-producing, with the exception that there is no limit to the market for silk, whilst the honey market is constantly being overdone. According to Coghlan's "Seven Colonies of Australasia," the total value of honey and beeswax produced in all the colonies in 1896 amounted to £53,400, of which Queensland accounted for £5,800, or about 3d. per head of the population of the colony.

Plate LXVII.

ASCLEPIAS CURASSAVICA.

Botany.

PLANTS REPUTED POISONOUS TO STOCK.

BY F. MANSON BAILEY, F.L.S.,
Colonial Botanist.

RED-HEAD, OR MILKY COTTON-BUSH (*ASCLEPIAS CURASSAVICA*, Linn.).

A WEST INDIAN soft-wooded small shrub of 2 to 5 feet high, which has become naturalised, and overrun many parts of Queensland. The leaves are narrow, and in appearance something like those of the Oleander, but are of a softer nature. The flowers, which are in loose bunches, are of an orange-red and yellow colour. Seed-pods (follicles) smooth, 4 or 5 inches long, tapering much from the base to the point, and closely packed with long seeds which have a tuft of silky hairs at one end. It is a native of the West Indies, but has overrun many tropical and semi-tropical regions.

I have often received specimens of this plant, with a report that it was suspected of causing injury to stock, and there is every reason to believe that it would do so, if eaten in quantity, belonging as it does to a family (Asclepiadeæ) which contains many plants known to possess poisonous principles; an acrid milk, which pervades all their parts, being eminently emetic and purgative. Although rather plentiful in many localities, I consider it hardly likely that stock would touch it, except in times of drought, when, as is well known, they browse upon almost any green plant they meet with.

According to Don, the juice of *A. curassavica*, made into a syrup, is said to be a powerful anthelmintic. In the West Indies it is given to children for that purpose, from a tea to a table spoonful. The juice and pounded plant are reputed to have the power of staunching blood. The root dried, and reduced to powder, is frequently used by the negroes as an emetic, and hence its name of "Wild Ipecacuanha." Dymock says that Dr. Guimaraes described the physiological action of *A. curassavica*. He found it to act directly upon the organic muscular system, and especially upon the heart and blood vessels, causing great constriction of the latter and distension of the larger arteries. Secondly, it occasioned great dyspnœa (difficulty of breathing), vomiting, and diarrhœa.

In the October (1897) number of the *Kew Bulletin* an account of this plant as an insectifuge is given. It states that it grows everywhere, as a weed, about the Isthmus of Tehautepec (Southern Mexico), and is used by the Indians there to keep away vermin, especially fleas. They make a broom of it, and sweep the floors and walls of their huts, and find that they are not troubled with fleas for a considerable time afterwards. They have also tried brushing dogs with it when their coats are full of vermin, and it appears to answer the same purpose with them. The Indian name of the plant is "Chilpati."

Popular Botany.

OUR BOTANIC GARDENS.

No. 8.

By PHILIP MAC MAHON, Curator.

You pass into the shade-garden by ascending a short flight of steps, and in doing so you pass under a shade tree of more than usual beauty.

It is *Albizzia odoratissima*, and, as its name implies, is most deliciously scented. Its lovely yellowish-white flowers, on a background of the freshest and loveliest green, hang to the very ground in a perfect cascade of beauty. It is an ideal tree to plant for shade, but, unfortunately, with us it does not bear many fertile seeds. There is another species, *A. procera*, which is a quick-growing and effective shade tree. One thing, if you watch Nature from day to day in our Gardens, which will strike you about these trees is the rapidity with which they renew their leaves. You have hardly time to notice that the branches have become denuded of the hard dry leaves of last year's growth, which have outlived their usefulness, than there is a magnificent crown of fresh green foliage with a wealth of beautiful blossoms which scent the air for a good many yards around. You enter the shade-garden through a door made in imitation of a portcullis of the feudal days, when every man was a law unto himself (that is, if he happened to have a castle), and when the power to shut out an enemy at a moment's notice was a matter of some consequence.

The first thing which will probably strike you about this shade-garden is that it seems to be hardly shaded at all, and that the plants seem in some unaccountable way to be condoning for this neglect by thriving in a most remarkable manner. The fact is that nearly all the shade-gardens one meets with are rendered useless by being shaded to a wholly unnatural degree. Sunlight is the life of plants.

At the village of Newtown Park, near Dublin, there stands an obelisk 100 feet high, and the writer remembers that when he was a small boy the following curious circumstance took place concerning it:—To one side of this obelisk was sown a crop of oats, and when that crop grew up it was noted by the villagers, or some of them, with superstitious dismay, that the outline of the obelisk was clearly traced in the crop; the oats, for an area exactly corresponding to the shape of the obelisk, being stunted, while the crop around was quite vigorous. Many were the reasons assigned to account for this fact, spiritual agency being first favourite. But someone, pursuing his investigations in the early morning, found that the shadow of the obelisk at sunrise was thrown on that identical patch, and deprived it of the early morning sun, hence its comparatively poor growth. You remember the oft-quoted example of the potatoes in the cellar pushing forward their growths towards the keyhole till at last one actually protruded. There is nothing overdrawn about this. Plants must have light or perish. Even nut-grass, that plague of the gardener, is one of the first to succumb to want of sunlight. What the class of plants usually grown in a shade-garden requires is broken sunlight. The vast majority of plants possess most remarkable contrivances and adaptations of structure to enable them to adapt themselves to the ever-varying quantity of sunshine from day to day and at different periods of the same day.

You have seen and admired the governor-valve on a steam-engine. You know that the faster the shaft revolves the wider apart the weights on the governor are slung, and the further the lever which closes the steam-valve is forced, thus equalising the speed. So in many a plant when the sun shines too full upon the face of a leaf, the plant solves the difficulty by just turning the edge to Master Sol until his rays have become sufficiently mild to be borne without too great a loss of moisture. That is one of the reasons why the Eucalypti (gum-trees) yield so little shade. Their flat surfaces are not turned to the sun. Again, if there is an absence of rain the blades of grass will curl

up, will they not? That is their way of protecting themselves from the rays which would absorb the last drop of moisture from their tissues. Now to altogether stop the free exercise of this natural function is like sending a healthy man to bed and keeping him there. He would soon become a sick man. The less artificial the conditions under which you carry on any system of plant culture the better for the plant, though, of course, in many forms of industrial cultivation, an artificial product is what is chiefly aimed at, and then the guide of Nature to some extent fails us. The stuffing of turkeys is not natural, but the excellence of the result is undeniable.

Do not therefore be alarmed if some of your plants curl up a little, unless you have reared them in an artificial manner to begin with. It is only when the curling or wilting goes too far that serious results are to be feared. You may often see during the heat of the day the Marantas and plants of that type in this shade-garden presenting a wilted appearance, but directly the sun's rays are moderated they expand once more and are ready to absorb the cool moisture which collects on their surfaces during the night.

When you enter the door you will notice directly in front of you a pillar wreathed round with a very dark-green creeper, which grows upon the pillar and an iron bar in a curious resemblance to a cross. The facility with which this creeper can be trained on the most slender support, such as a piece of wire stretched from point to point, makes it most useful for the purpose of forming wreaths of foliage in the shade-garden. With a little ingenuity, very artistic effects can be produced in this way. Some examples of arches so formed may be seen in another part of this structure.

The plant *Piper nigrum* is that from which we derive that most useful condiment, pepper, both black and white, the latter being produced by allowing the fruits to ripen before they are picked. Pepper has had a very respectable antiquity, and was at one time held of no small account. We read that Alaric, king of the victorious Visigoths, demanded, in approved modern fashion, a war indemnity from the Romans, whose city he had invested. The items were 5,000 lb. of gold, 30,000 lb. of silver, 4,000 silk garments, 3,000 pieces of fine scarlet cloth, and 3,000 lb. of pepper. This was 1,490 years ago. A pepper-corn rent is looked upon as the very easiest form of tenure; but it was a very serious form of rent indeed in the Middle Ages when it was first introduced, and meant payment of 1 lb. of pepper yearly. This plant is a native of close valleys in South-western India, in a latitude corresponding to that of our Northern districts north of the 20th parallel, but it has been introduced into several other countries, notably Java, where it is cultivated at a great profit. It must have the shade of trees, and a common way of growing it in India is to clear the jungle of undergrowth, allowing the trees to stand, and planting at the base of each a few vines, manuring them with some decayed leaves. This would prove a good way of trying the plant in the scrubs near the margins of some of our Northern streams. It propagates quite easily from cuttings, of which there are any number here. In artificial plantations the mother trees are usually mangoes, Jack fruit, or *Erythrina indica*.

It may be mentioned here—and this is true of almost all the subjects touched upon in these papers—that the avocation of a pepper-planter is one in itself in the countries where this article is produced in perfection. The methods employed in, say, India, Java, and Sumatra are quite distinct. The writer of these papers disclaims any intention or desire of urging or advising any cultivator to dissipate his energies over a variety of products, or to waste too much of the time which he might otherwise usefully employ in “experimenting.” He considers that the old-fashioned advice, “Put not all thy eggs into one basket,” is pretty well played out. His advice is, “First know your basket, get as many eggs as possible into it, and then *look after that basket*.” The latest price current for pepper in London was 4d. per lb., and over 23,000,000 lb. are annually imported.

To the right you will note a large creeper sending out aerial roots with which it seizes hold of woodwork and tree-stems, not by the process of clasping them in the way with which we are familiar in the cases of many climbers,

but by the still more remarkable way of lying flat against them and just growing to them like some weird vegetable octopus sprawling his tentacles over his neighbours and anchoring himself. These air-roots are intruded everywhere, between chinks of timber, under the bark of the trees he clings to, down to the ground. When they reach the latter, they become fibrous, and send up nourishment to the plant above. Wherever a joint of the main stem comes in contact with anything it can cling to, out come two little bunches of rootlets, one on each side.

On the centre post nearest the door (the one upon which the pepper is growing) you will notice a splendid-looking plant which has a peculiar way of clasping the pillar, which may be mentioned here. It sends out large roots on each side like arms, and climbs as though it were a man swarming up the post.

To return to our Philodendron, for that is his name (tree-lover). When his tentacles are small they are covered near the points with tiny hairs which look like velvet. These are the mouths with which he sucks up the moisture of the dank jungles in which Nature has fixed his native home. Turn again to that curious plant on the centre post. It is called *Monstera deliciosa* (sorry there is no expressive vernacular name). Observe the holes in the leaves; they give a curious appearance of artificial work to the leaf. It is difficult to believe that they have not been cut out with a pair of scissors. What can be their object? for you remember we agreed that everything in Nature has an object. Well, you recollect what we said just now about sunlight being necessary to plants. Now these are the windows through which the sunlight reaches the lower tiers of leaves, and reaches them as broken sunlight, on account of the motion of the sun constantly changing the point of impact. To the left, a little further on, is a plant of *Aralia Guilfoylei*. It is a very ornamental plant. Many species of the genus to which it belongs contain a drinkable sap. The Ivy, so well known in the old country, belongs to this family; indeed, there is a plant trailing amongst the rafters over your head. It is curious that every winter here extra precautions have to be taken to keep the rats from the plants of this genus. They (the rats) come up from the river and enter the greenhouses, find out the plants by an unerring instinct, and straightway ringbark them, no doubt for the sake of the mucilage contained in the under-bark.

You will note growing along the wall to the right some good examples of staghorn and elkhorn ferns. It is a pity that the lovely forms of our native flora are not more frequently used in artistic design. An exception, when met with, is worthy of notice, and this exception amounts to a stroke of genius. It is the use of the staghorn fern as a bracket support over the entrance to the Parliamentary stables in the new façade to Parliament Buildings. Why not an Australian order of architecture with staghorn capitals instead of acanthus? Passing along and noting to our right a gully in which grow plants which love a humid position, we find two seats which will serve for us to mark the spot above which may be seen an example of a little-known Queensland fern. It is called *Ophioglossum pendulum*, and is always found growing in company with the staghorn, hanging from the bases of the old leaves of the latter. Part of the fronds you will notice are fertile or spore-bearing, and part are barren. Space forbids a discussion of fern fructification this month.

A CORRECTION.

IN a recent description of a ladder for use in garden and orchard, through the accidental omission of the word "half" before the words "the diameter," on line 14, page 262, it was made to appear that the ladder should project below the shafts a distance equal to the diameter of the wheels. It should, of course, have been (as shown in the photographs) *half the diameter*, technically the radius. But the stability of the ladder would have been in no way affected. It would have been awkward to handle, as the shafts would not have been parallel to the ground as intended.—P.M.M.

Tropical Industries.

MANURING OF TROPICAL PLANTS.

TOBACCO.

With regard to the kind of soil upon which tobacco thrives best, Dr. A. Stutzer* remarks: "The tobacco-plant requires a light, loose, permeable soil, rich in humus, and not sour. Heavy, cold, clay soils, deficient in humus, must be avoided. The tobacco-plant must develop rapidly during the short growing season, and its roots must penetrate deeply into the soil, in order that they may absorb sufficient quantities of moisture and plant-food ingredients. . . . The best tobacco-soils contain a natural supply of more than 1 per cent. of potash. If this store be reduced to less than 0·5 per cent., an application of the proper potash salts will increase the quantity and quality of the yield. Notwithstanding the fact that tobacco contains a considerable quantity of lime, the tobacco grown on calcareous soils is often inferior in quality. Whether this is due to the tobacco or to the absence of other constituents (humus, &c.) has not yet been clearly established. As a general rule, good tobacco soils should, in the dry state, contain not less than 0·5 per cent. and not more than 2 per cent. of lime. The application of lime or marl to soils deficient in lime produces good results."

According to Dr. Barth, Rufach, a crop of 1,784 lb. air-dried tobacco-leaves and 1,784 lb. air-dried stems removes from one acre—

107 lb. Nitrogen
125 „ Potash, and
14 „ Phosphoric acid.

The same author gives the following figures: 1,000 lb. of tobacco-leaves (Alsace tobacco) contain—

31·46 lb. Nitrogen
34·26 „ Potash
3·95 „ Phosphoric acid ;

whereas Wolff, in his ash-analyses, gives the following average—

24·5 lb. Nitrogen
40·9 „ Potash
4·5 „ Soda
50·7 „ Lime
10·4 „ Magnesia
6·6 „ Phosphoric acid
8·5 „ Sulphuric acid
9·4 „ Chlorine.

Mr. A. Brunner, of Helyana Landen, near Palembang, found in 1,000 lb. of three varieties of Sumatra tobacco from Deli—

	Pongey Estate.	Kwaloe.	Lau Bentoe.
Total nitrogen	28·6 lb.	36·7 lb.	27·7 lb.
Nitrogen in form of nitrate	12·1 „	18·2 „	14·5 „
Potash (? + soda)	60·3 „	66·9 „	79·1 „
Lime	55·4 „	39·5 „	31·9 „
Magnesia	19·7 „	14·7 „	14·2 „
Phosphoric acid	6·0 „	5·0 „	4·6 „
Chlorine	4·7 „	4·8 „	2·0 „

* Dr. A. Stutzer : Die Düngung der wichtigsten tropischen Kulturpflanzen, 1891.

The tobacco from the Pongey Estate burnt excellently and gave a white ash; in a word, it was of prime quality. The other two were heavy and oily; Kwaloe burnt well, but gave an ash, grey to black in colour; Lau Bentoe burnt black, and gave a black ash.

A good yield of tobacco, as regards both quantity and quality, depends upon two factors, viz:—

- a. Sufficient quantities of plant-food in an easily assimilable form must be furnished to the growing plant on a suitable soil.
- b. The plant-food ingredients applied must bring about the conditions that will render possible the development of a good leaf, rich in mineral constituents.

A soil intended for the cultivation of tobacco must contain a sufficient quantity of humus, which is generally present in virgin soils or tropical fields that have lain fallow for a number of years.

However, in most instances, the quantity of humus in the soil has become depleted in the course of time, and, moreover, circumstances do not always permit of letting land lie fallow for a number of years. When this is the case, an artificial application of humus to the soil is of prime importance.

Humus may be applied to the soil in the form of stable-manure, compost, or oil-cakes, as well as by green manuring.

When stable-manure is used, it should be applied yearly, as the weather conditions in the tropics accelerate decomposition. An annual application at the rate of about four and a-half tons per acre is sufficient. It is best to apply stable-manure in a half-rotted instead of a fresh condition. The use of liquid manure without litter should be avoided, on account of the high percentage of injurious chlorine it contains. However, as the planter in the tropics has but rarely sufficient quantities of stable-manure at his disposal, manuring with composts, &c., is of prime importance.

In the following paragraphs the most essential plant-food ingredients required by the tobacco-plant, the forms in which they should be used, and the manner of their proper application, are fully discussed.

NITROGEN.

A sufficient amount of nitrogenous food is indispensable for the growth of the tobacco-plant. This constituent furthers the development of the plant, and tends to produce the highest yield during the short growing season. The effect of different nitrogenous fertilisers upon the quality of tobacco, though, varies considerably, and great caution must, therefore, be exercised in selecting the proper substances. It is advisable to avoid those nitrogenous fertilisers that contain nitrogen in the form of ammonia or in the organic state; those in which nitrogen occurs in the form of nitrate are preferable. The former are liable to injure the good burning quality of the tobacco-leaves and, consequently, the good aroma.

Experience has proven that nitrate of soda and nitrate of potash, in case the latter material can be procured, are the best sources of nitrogen for tobacco. Prof. A. Cserhati* holds that sulphate of ammonia produces an increased yield, though only at the expense of quality; it decidedly injures the burning quality of tobacco, while nitrate of soda, even though applied in large quantities, has no harmful effect, provided, of course, that the plant is sufficiently supplied with the other essential plant-food ingredients. Fish guano, tankage, wool-refuse, hair, and liquid manure must be avoided as much as possible; Peruv. guano also should be applied with caution.

* Prof. A. Cserhati: "Versuche über die Brennbarkeit des Tabaks," Journal für Landwirtschaft, vol. 43, 1895.

PHOSPHORIC ACID.

The effect of phosphoric acid fertilisation upon the quantity and quality of tobacco has not yet been definitely determined. The results obtained, especially as regards the burning quality of tobacco, are in several instances diametrically opposed. Experiments indicate that a general rule for the application of phosphoric acid cannot be established; the quantity of this ingredient, however, and the form in which it should be applied, must depend upon the local conditions of the soil, and especially upon the percentage of phosphoric acid which the latter contains. Prof. Nessler has found, as the results of many experiments, that the injurious effect of chlorine is relatively insignificant as compared to that of phosphoric acid. Prof. Cserhati, on the other hand, holds that it is only in exceptional cases that phosphoric acid injures the burning quality, and then but to a comparatively small degree; whereas there are numerous instances in which fertilisers containing phosphoric acid improve the burning quality and increase the yield under favourable circumstances.

Due attention must be given to the application of phosphoric acid, as it is well known that this ingredient hastens maturity. Moreover, its application is important because of the mutual effect which most of the plant-food ingredients have upon the development and growth of plants. Mixtures intended for tobacco should include phosphoric acid in amounts corresponding approximately to the analyses given above. The changes necessitated by local conditions can only be determined by experimenting.

As the absorption of phosphoric acid by the tobacco-plant extends almost uniformly over the growing season, no essential differences resulting from the application of acid phosphate and Thomas' slag have hitherto been noticed. Both of these materials are preferable to bone-meal and Peruv. guano as sources of phosphoric acid, and the cheaper of the two former should be used.

POTASH.

The great importance of potash fertilisation for tobacco is clearly demonstrated by the large quantity of potash removed from the soil by this plant. The beneficial effect of potash is more marked upon the quality than it is upon the quantity, though good results cannot be expected in either particular, unless sufficient quantities of nitrogen, phosphoric acid, and lime are, at the same time, placed at the disposal of the plant. Fertilisation with potash alone will not, therefore, be apt to produce satisfactory results. Excellence of burning quality usually corresponds to a high percentage of potash and a low percentage of chlorine. For this reason, fertilisers containing chlorine should be avoided; potash salts, like muriate of potash, kainit, &c., should not be applied to tobacco, the proper forms of potash and potash-magnesia to be used for this plant being the sulphates, phosphates, and carbonates.

No definite recommendations can be made as regards the particular form to apply, because the results of various experiments, conducted for the purpose of solving this question, quite frequently produce contradictory results. In this connection due consideration must be given to local conditions. The best burning-quality results when the potash contained in the tobacco-leaf is combined with organic acids. It is, therefore, advisable to apply the potash salts as early as possible, in order that they may be converted into carbonates and humates.

Light sandy soils require larger quantities of potash than loamy and clayey soils; the latter are not very suitable for the cultivation of tobacco.

Cottonseed-husk ashes, as well as wood ashes, are very good sources of potash for tobacco. The commercial supply of these materials is, however, limited; they are also often leached, and, besides, the amount of potash they contain does not correspond to the prices demanded for them. The ploughing under of tobacco-stems also furnishes some potash to the soil, though not enough to satisfy the needs of the plant.

LIME.

It is well known that burnt lime is an indirect fertiliser—that is, it increases the availability of the plant-food ingredients present in the soil, and improves its physical condition.

It has been observed that calcareous soils produce tobacco of a poor burning quality; on the other hand, though, Prof. Cserhati concludes from his experiments that the addition of lime to clay soils deficient in this material decidedly improves the burning quality of the leaf. However, he ascribes this improvement to the beneficial effect exerted by lime on the condition of the soil.

In two experiments made on the Santa Rosa Plantation, in Pinar del Rio, Cuba, the tobacco-seed was mixed with three parts of sand, and distributed uniformly over the hot-beds by hand on 14th September. The sowing had to be repeated on 20th October, as the first seed was destroyed by a storm accompanied by much rain. The earth of the hot-beds was manured uniformly with a mixture containing 30 per cent. phosphate of lime, 7 per cent. nitrogen, and 2 per cent. potash. The plants were transferred to the experimental plots on 9th December, after the roots had grown to a length of 1.18 inches, the stems 1.57 inches, and 3-4 leaves 3.54-4.72 inches. The plots had been ploughed crosswise in November, and fertilisers (in quantities mentioned above) applied in small heaps where the plants were to be set out, and mixed lightly with a little earth. The distance between the heaps was 27.56/15.75 inches, the plots were 0.02471 acre in size, and there were 350 plants to the plot, corresponding to 14,164 plants to the acre. About 1 oz. (.95+) of the mixture was applied to each plant on plot 4; or at the rate of 856 lb. per acre, made up as follows:—

205 lb. double superphosphate (42 per cent.),
330 „ carbonate of potash-magnesia, and
321 „ nitrate of soda.

The plants from plots 10 and 4 were measured with the following result:—

		Plot 10. Unfertilised.	Plot 4. Fertilised.
Height of plant		17.7 inches	25.6 inches.
Pairs of leaves		4-5	4-5
Length of leaves		15.8 inches	23.6 inches.
Width of leaves		9.1 inches	13.8 inches.

These experiments will be continued, as definite results have not yet been obtained, though the application of carbonate of potash-magnesia was seen to be of much benefit. The fertilisers applied, and the condition of the leaves early in 1895, before the harvest, are given in the table below:—

No. of Plot.	Fertilisers Applied.	Condition of Leaves before Cutting.
1.	Sulphate of potash	} Fair, like that of unfertilised plot.
	Nitrate of soda	
	Phosphate of lime	
2.	Sylvinit	} Fair, like that of unfertilised plot.
	Nitrate of soda	
	Double superphosphate	
3.	Schoenit	} Middling, inferior to unfertilised plot.
	Nitrate of soda	
	Phosphate of lime	
4.	Carbonate of potash-magnesia	} Excellent.
	Nitrate of soda	
	Double superphosphate	
5.	Phosphate of potash	} Fair, like unfertilised plot.
	Nitrate of soda	
	Phosphate of lime	

No. of Plot.	Fertilisers Applied.			Condition of Leaves before Cutting.
6.	Nitrate of potash	...	...	} Middling, inferior to unfertilised plot.
	Nitrate of soda	...	...	
	Phosphate of lime	...	...	
7.	Sulphate of potash	...	...	} Excellent.
	Sulphate of ammonia	...	...	
	Phosphate of lime	...	...	
8.	Sulphate of potash	...	...	} Good.
	Phosphate of ammonia	...	...	
9.	Phosphate of lime	...	...	} Middling, inferior to unfertilised plot.
	Nitrate of potash	...	...	
10.	No fertiliser	...	...	—

Mr. A. Brunner, Helyana-Landen, near Palembang (Sumatra), reports upon the following experiments with fertilisers:—

1. Plants set on 23rd February, 1894, 10,117 to the acre. Sulphate of potash and carbonate of potash-magnesia were applied, in addition to green manuring with legumes. The tobacco from the various plots was tested and analysed at the Agricultural Experiment Station in Rufach by Prof. Barth, and the following result obtained:—

Potash Fertilisation per Acre preceded by Green Manuring with Legumes.	Comparative Capacity of Holding Fire.			Ash.	Potash.	Chlorine.	Nitrogen
	Greatest.	Average.	Least.				
	Seconds.	Seconds.	Seconds.	P. cent.	Per cent.	Per cent.	Per cent.
I. No potash fertilisation	120	108	83	16.72	4.68	0.25	3.10
II. 111.5 lb. sulphate of potash ...	120	100	87	19.47	7.54	0.30	2.77
III. 223 lb. sulphate of potash	120	115	105	19.56	7.05	0.25	2.95
IV. 294 lb. carbonate of potash-magnesia	120	120	120	19.08	6.73	0.36	3.06
V. 446 lb. carbonate of potash-magnesia and 53.5 lb. sulphate of potash	120	117	110	18.94	6.48	0.32	2.88

Two hundred and ninety-four pounds of carbonate of potash-magnesia per acre produced an improvement in the burning quality. The increase of this application to 446 lb. failed to produce a corresponding improvement, nor was the quantity of potash absorbed by the plant increased.

Unfortunately, the absence of a sufficient number of labourers made it impossible to gather the yields from the various plots separately. The total yield from 2,471 acres, exclusive of second sprout, was 2,640 lb. of Delideck-leaf tobacco, which sold at 5 Fl. per Dutch pound in Rotterdam.

2. Another experimental field was planted on 25th December, 1894. The results of the tests conducted at Rufach were as follows:—

Plot.	Fertilisers applied per acre.			Comparative Capacity of holding Fire.
	Nitrate of Potash.	Burnt Lime.	Double Superphosphates.	Average.
1	268	161	36	108 seconds
2	535	321	71	115 "
3	268	321	36	89 "
4	268	321	71	104 "
5	268	—	—	103 "

Plot.	Ash.	Alkalinity of		Chlorine.	Nitrogen.
		Ash, computed as Potash.			
1	17.28 per cent.	4.12 per cent.		0.12 per cent.	3.43 per cent.
2	18.54 "	5.59 "		0.37 "	3.16 "
3	16.50 "	4.52 "		0.25 "	3.30 "
4	17.28 "	4.72 "		0.31 "	3.63 "
5	18.90 "	4.02 "		0.23 "	3.12 "

These varieties of tobacco all burn excellently (the maximum comparative capacity of holding fire being over 120 seconds in every case); they contain much potash and little chlorine. The excellent quality of tobacco obtained from plot 5 proves that lime and phosphoric acid were of no special benefit to this soil. Whether these materials produced a beneficial effect upon the quantity, is not clearly demonstrated by the figures at hand. Unfortunately, the plan of experiment did not include a plot fertilised with neither potash nor nitrogen, which would have offered better means of comparison.

Animal Pathology.

NOTES ON THE NATURAL HISTORY AND PREVENTION OF TEXAS FEVER.*

By J. SIDNEY HUNT, M.R.C.S.,
Government Pathologist.

THE "tick plague," taken as a whole, is a very large subject, and it is one that presents so many different aspects—each more or less interesting and important—that it was no easy matter to determine what particular one to select for consideration this evening. I might, for instance, attempt to compress, within limits which should not unduly tax your patience, a general outline sketch of the whole tick question. But this has been rather hackneyed. And it could, I think, serve no very useful purpose to inflict upon you once more the whole history of the tick and the disease. You are, I am sure, perfectly well acquainted with the tick and his ways, and his general wickedness, and are also, I am afraid, not unfamiliar with the disease. Or I might, again, confine myself exclusively to what may be called the mechanical application of the inoculation process; but this also has been repeatedly described, and is in itself so simple that it can be easily learned and perfectly well carried out by anyone who has once seen it done, as I have already had an opportunity of showing you; and to further occupy your time with such a matter would, I venture to think, be neither interesting or complimentary.

Instead of any such topic, I shall therefore endeavour to present for your consideration some other aspects of the subject which have been less frequently dealt with, but which appear to me of primary importance if we would have a clear view of the nature and causes of the disease we call "tick fever," and of the means at our disposal of combating it.

THE NAME OF THE DISEASE.

Before getting to work on the particular patch I have chosen, I must, however, try and clear the ground of some obstructions which cumber it and impede our view. I mean the variety of names that we have for what is essentially

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one and the same thing. The disease we are considering has, in fact, about as many names as the chameleon has colours, and, like the chromatic vagaries of that reptile, they lead to endless confusion. But just as the chameleon remains the same chameleon whatever tint it may assume, the disease we are considering remains always the same disease, by whatever name we may choose to call it. Whether we call it "redwater," "tick fever," "Texas fever," or any other name, matters little, so long as we bear always in mind that these mean essentially one and the same thing—viz., infection of the blood by the same peculiar micro-organism.

I have, however, good reason to know that this has not always been recognised, and that the names mentioned have been supposed to represent so many different diseases.

A rather amusing illustration of this occurred a little while ago when a friend of mine, being delayed at a wayside station on the Northern Railway, endeavoured, as is his wont, to improve the occasion by seeking all available information. Seeing two likely-looking youths who he thought might know something about cattle, ticks, and tick fever, he asked them if there were any ticks thereabouts, to which they replied, "Any amount." The next question was—"Are they doing any harm, or killing any cattle?" And the reply was quite definitely, "No." He then asked if any cattle were dying; and the answer came promptly, "Any amount—from redwater—and if they continue dying at same rate there will soon be none left." My friend made some reference to inoculation, but they seemed to know very little about it, and someone joined in that your present lecturer was a fraud, and knew nothing about the disease: he had a trip to America for nothing. Leaving out the charming candour and directness of the latter opinion, the little incident was, I think, instructive, because it showed clearly the confusion still actually existing as to the nature of "redwater" and its relation to the ticks.

And if this has been the result of calling one disease by two or three different names, it would be curious to know what would happen if the hundred-and-one other names by which this same bovine infection is, and has been, known in various parts of the world were to become popularised amongst us. But I imagine still greater confusion would ensue, and there would appear to be such a pandemonium of jaw-breaking diseases abroad as would drive every cattle man distracted from the country.

When one thing is called by many names it is generally, I think, because none of them are perfectly appropriate. Far be it from me, however, to introduce a fresh one for this disease. It would, I should say, probably be better to do away with the words "redwater" and "tick fever" altogether, and stick to the older and more widely known designation of "Texas fever."

"Redwater" is a most peculiarly unfortunate name, because it has already been applied to quite other diseases in cattle in which discoloration of the urine also happens to be present, and, further, because such a condition of the urine is at best only a symptom—and a by no means necessary or invariable one at that. In many cases of Texas fever it is altogether absent. Just as well might we call malarial infection the "shivering disease," forgetting that shivering is a symptom common to many other conditions, and that malarial infection may be present without any of the shivering fits so common in typical ague. "Redwater" is just about as characteristic of Texas fever—or as necessary to it—as shivering is to malarial infection.

"Tick fever" also seems to me open to objection, because it implies that the tick causes the disease; whereas, as I shall presently have occasion to point out, it does not necessarily do anything of the kind; and when it does take a hand in the production of the disease, it does so only in an indirect way, in the same way as an inoculating syringe might do. Hence, the term "tick fever" appears only perfectly appropriate when used in a sense antithetical to "inoculation fever"—the one meaning the fever produced through the agency of the tick, the other the fever produced through the agency of the syringe.

"Texas fever" is open to no such objections. It involves or implies no such errors. It is simply a name of local origin to express the disease we have to consider, whose essence is known to be a certain peculiar blood infection.

ANALYSIS OF THE TICK PLAGUE.

If we, as it were, resolve the tick plague into its constituent parts, we find that there are several distinct factors at work, with each of which we are all pretty familiar. My object is not so much to discuss these factors individually, but to endeavour to trace out the relations which they bear to each other, and the relative parts they play in the production of the tick-plague drama. The actors are the tick, the microparasite, the bullock, and the fever—which may perhaps be held to represent the music; with—if you will allow me to complete the picture—the discomforted owner as audience.

In this cast, the chief characters which we shall have to consider are the microparasite and the tick. The interest of the piece indeed lies largely in the combined machinations of these two for the accomplishment of their wicked purposes. The microparasite, it must be clearly understood, plays throughout the part of first villain.

THE PART PLAYED BY THE TICK.

The cattle tick—and in speaking of *the* cattle tick I do so without prejudice to the possible claims of any closely-related variety, or even distant cousin, to be included in my remarks—is, I am inclined to think, a rather maligned and misunderstood character, or is at anyrate not quite so black as he is sometimes represented. His sinister repute is due chiefly to that unreservedly bad character the microparasite, with whom he is, unfortunately, so often associated. The microparasite merely uses the tick to effect its own—and from our point of view, highly objectionable—purposes; and, as not infrequently happens in such cases, the tick gets all the blame. Anyway we know that the tick himself, when free from his microscopic and mephistophilean associate, is a comparatively harmless fellow, in that he does not at anyrate produce Texas fever. For it is a matter of common experience that the tick may be, and very frequently is, present upon susceptible cattle for a considerable time—for many months, or it may be for years—before any Texas fever breaks out amongst them. It has also been shown by experiment that such infested cattle contract the fever at once if removed to a place where the ticks are known to be charged with the germs of the disease. So that the mere presence of ticks, even when they have been present in large numbers for a long time, in itself affords no immunity against Texas fever. It has also been shown that the blood of such infested but still susceptible cattle causes no reaction when injected into clean animals, and confers no immunity.

The relation of the tick to Texas fever in cattle appears to be precisely parallel to the relation of the mosquito to malarial infection in man. The mosquito is now very generally recognised as the agent by which the malarial germs are inoculated into our blood, but for all that it is perfectly certain—and very fortunate for us—that *all* mosquitoes are not charged with these germs, and therefore convey no such disease. And the tick, when free from the fever germ, is no more capable of setting up Texas fever than is the mosquito, when similarly free, of causing malarial infection.

It has to be admitted, however, that ticks which do not cause Texas fever may yet, undoubtedly, cause heavy losses in other ways. For they tend, when in large numbers, to impoverish and wear down the cattle, particularly cattle that have not yet become inured to their presence, and such as are already impoverished in bad seasons by the want of sufficient good grass.

The precise way in which ticks kill cattle apart from the specific disease—Texas fever—is not thoroughly known. It seems possible they exert their deleterious influence, in part at anyrate, in the way generally supposed—viz.,

by the mechanical misery and irritation they cause, and by the constant abstraction of small quantities of blood. As regards the last we know well that the *constant* loss of even a small quantity of blood in any animal has a quite different physiological effect to that produced by a single abstraction of much larger quantities, or even repeated bleedings at comparatively distant intervals.

But I, personally, incline to the belief that, in addition to these influences, there is another factor at work, and that the tick, like most other creatures of its kind, introduces some peculiar poison of its own. I am not now referring to any microparasite or organism foreign to itself with which it may be contaminated. Of that I shall have to speak directly. I refer to a poison comparable to that ordinarily introduced by mosquitoes, fleas, gnats, sandflies, and the like. I know of no way in which this assumption can be directly proved; but it seems to me, on the face of it, improbable that the cattle tick alone is unprovided with some such poison of its own, and, considering how virulent the poison of other species of ticks is known to be, I should say some pretty active poison. The local irritation or inflammation caused by cattle ticks in animals that have not become accustomed to their presence is strictly comparable to similar inflammation brought about on the face and hands of the "new chum" by the welcoming activities of the mosquito. But, as we all know, the "new chum" becomes the "old chum," and, although the mosquitoes still favour him, he eventually acquires an almost complete immunity to the inflammatory effects. The same thing appears to happen to cattle and horses that have become inured to ticks. The explanation in all these cases is probably the same—viz., that there is produced in the blood of the man, horse, or bullock some substance or quality which antagonises or counteracts the respective poisons of these insects—though I should not properly call the tick an insect, as he is not justly entitled to that rank, and belongs to a somewhat lower natural order.

Another reason I have for suspecting an organic chemical poison peculiar to the tick—though I will not now dilate upon it—is that in the blood of tick-infested cattle, where no Texas fever has ever appeared, there are frequently to be found what I take to be evidences of the breaking up of what are known as the nuclei or kernels of the white-blood corpuscles into small highly refracting bodies which, when free in the blood stream, might easily be mistaken for—and possibly have in certain instances been mistaken for—forms of the Texas-fever organism; for an erroneous observation of this kind would readily account for the erroneous conclusions which have been formulated to the effect that tick-infested cattle are necessarily immune to Texas fever, and that their blood is necessarily suitable for inoculating purposes.

Other effects are sometimes noticed on the red-blood corpuscles and on the coagulating power of the blood in grossly infected but still susceptible cattle, but of a quite different kind to those seen in cattle suffering from Texas fever. And these effects on the elements of the blood are, I think, such as may quite reasonably be referred to the action of some specific tick poison.

Whilst on the subject of the direct harm wrought by the ticks, it may be mentioned that the condition of poverty, misery, and exhaustion, very appropriately called "tick poverty," which so often wears down and destroys cattle when first they become grossly infested by myriads of ticks, can be very effectively relieved and counteracted by cleansing them of the ticks—as by dipping. And this fact is, I think, evidence that the particular condition in question is due rather to the direct effects of the ticks themselves than to infection of the blood with any living micro-organism. Tick poverty, moreover, results only from gross infestation. Texas fever (even in the acute and characteristic form often called "redwater") is not infrequently communicated by ticks when so few as to be hardly discoverable; facts perfectly intelligible on the view that the poverty is caused by the external multiplication of the ticks, just as the fever is caused by the internal multiplication of the microparasites.

Tick poverty almost invariably affects cattle when they first become grossly infested, quite irrespective of whether they have been rendered, by inoculation, immune to Texas fever, or are still susceptible to that disease. In other words, they may acquire the comparative immunity to the local effects of ticks which comes of usage, or become "tick proof," without being necessarily immune to Texas fever; and likewise they may be rendered immune to Texas fever (as by inoculation) without being rendered proof against tick poverty. These two things are quite distinct. And, as might be expected, dips are of unquestionable value in combating the poverty from gross infestation, though they are, as far as my experience goes, quite ineffective in protecting cattle from the fever.

THE MICROPARASITE OF TEXAS FEVER.

So much then for the part played by the tick itself. We have now to consider the microparasite of Texas fever, and more particularly its relation to the bullock on the one hand and to the tick on the other.

Its relation to the bullock is very evident, for it behaves in all respects as a true blood parasite. It multiplies with amazing rapidity when it first gains access to the blood of a susceptible beast, invading and destroying a large number of the red-blood corpuscles, and thus produces the phenomenon of red-water which is so frequently seen in the acute form of Texas fever; and even after the complete recovery of the animal, it still persists for an indefinite time as a quiescent and inoffensive inhabitant of its blood.

The blood of the bullock is therefore the natural home of the microparasite. Here it flourishes, multiplies, and dwells, and, if the bullock were immortal, it might perhaps remain for ever through indefinite generations in this Elysian abode. But bullocks are "not built that way," and some provision has to be made for the perpetuation of the microparasite's race if it is not to be wholly extinguished on the death of its host. If it is to continue as a species, it must obviously have some means of effecting its escape from the blood of any particular bullock, and also of gaining access to a fresh host. This process of transference can be done artificially for it by means of an inoculating syringe, and the parasite passed on from bullock to bullock through an indefinite series. And from this circumstance it would seem that all that is necessary for the perpetuation of its race under natural conditions is some agent which shall perform for it this same office of transmission from one bovine animal to another.

THE MICROPARASITE AND THE TICK.

The relations existing between the microparasite to the tick are, I think, probably such as to fulfil this requirement. The tick, in fact, appears to act as a carrying agent on behalf of the microparasite. But it does its business in what seems a rather roundabout and tedious fashion. For, having withdrawn or taken delivery of the microparasite with the blood with which it has gorged itself, it devotes the remainder of its existence to its own private concerns, and leaves the final execution of its duty as a carrying agent—viz., the delivery of the microparasite to a fresh host—to the care of its progeny. And this office, as we know, they in many instances fulfil with painful precision.

In some cases, however, I venture to think there is a dereliction of duty on the part of the tick, and the microparasite is not transmitted; and then no Texas fever is produced by the young ticks. In what department of its carrying arrangements—with which, indeed, we are quite unacquainted—this occurs, I do not pretend to say. Possibly the tick on the infected beast fails, in some cases, to take delivery of the parasite, or, having done so, fails to hand it on to her progeny; or possibly the young ticks in their peripatetic energy and desire to see life—especially bovine life—somehow lose the run of their charge. Or, again, the fault may lie wholly with the microparasite itself; it may not have been in a fit state to start on a colonising expedition when it was withdrawn by the tick: it may have been too old or too young or otherwise incapable. Or, having safely embarked in the tick, it may have been

overcome in the vicissitudes of its subsequent pilgrimage: the sun may have been too hot, the shade too scanty, the weather too cold or too dry, the soil or pasture in some way unfavourable, or the young tick too long in finding a bovine host. Under any of these circumstances it seems conceivable enough that the microparasite, which we know to be a very sensitive organism, might pine and die before reaching its natural destination in the blood of some other bullock. Again, the young tick might convey its charge to some unsuitable host, in which it could not develop—such as horse or sheep—and, in that way, rid itself of its burden, or, as we generally call it, its contamination; and thus a race of non-fever producing ticks be established. For it is difficult to believe—and has, at any rate, not so far been satisfactorily proved—that ticks, which have matured upon naturally insusceptible animals (*i.e.*, non-bovines), can acquire from them and transmit to their progeny the germs of the disease. Though I am aware that it might be suggested that a germ-bearing tick, maturing on such a host, might still be able to retain and transmit to its progeny the germs of the disease which itself received from its parents, by a kind of hereditary transmission of virulence akin to the reproduction process called *parthenogenesis*, where the impregnation of a single female suffices for the fertilisation of many successive generations.

But I do not think that we have any evidence to warrant the supposition that there is any such intimate bond of union between the microparasite and the tick. On the contrary, I should say there are good grounds for thinking that the bond is a comparatively loose one, and that ticks *lose* the contamination with considerable facility. For it is difficult otherwise to account for the fact that ticks that were certainly, directly or remotely, derived from contaminated cattle, have altogether failed to produce any Texas fever in certain localities into which they have been carried, even though they have increased and multiplied for many generations, and have become enormously abundant upon the cattle in their new location. It would seem also that ticks, in their onward march through clean herds, tend, in some way, to become dissociated from the fever parasite. For the ticks spread faster than the fever, and the advance guard has been very frequently found not to produce the disease. Moreover Doctor Shroeder, of the Washington Experiment Station, succeeded in depriving ticks of their fever-producing power by causing each successive generation to mature on a fresh clean animal. The microparasitic contamination appears in this way to have been, so to speak, bred out of them.

It is perhaps necessary, however, that I should remind you that the views which I have just suggested, as to the part played by the tick as the transmitting agent of the microparasite, have not been definitely proved by exact experiment. They are put forward merely as hypotheses, and must in no way be regarded as *ex cathedra* opinions. I will ask you therefore to accept them only in a provisional way for what they may be worth, and in so far as they may commend themselves to your judgment. What we know for a certainty is, that the young tick is the agent by which the microparasite finds its way into the bullock; what we conjecture is, that the adult tick is the agent by which it finds its way out again. But it may be said that this supposition appears to be supported by the illustrious Dr. Koch, who, is reported, in reference to his South African experiments, to have expressed the opinion that young ticks, to produce Texas fever, must be the progeny of ticks that have matured upon sick animals.

It is conceivable, however, that the microparasite may exist in some unknown state or form in external Nature—in the grass, the soil, the water, or the air of certain localities, quite independently both of the bullock and the tick; and, if this were so, it is evident that ticks might acquire the contamination from other sources than the blood of an antecedent case of bovine infection. But if ticks do thus pick up the microparasite from external Nature, the microparasite must exist in places that are neither low-lying, coastal, nor swampy, for young ticks which have been hatched on high, dry, tableland country have very frequently communicated the disease. If they did not inherit the

germs from their parents, they must, of necessity, have acquired them *de novo* in such localities. And, in that case, there can be no ground for regarding the disease as one of coastal origin. As a matter of fact, though Texas fever is unquestionably more prevalent in places where the conditions are favourable to tick life, it has at times been communicated by ticks in all classes of country, and if the germs are picked up in external Nature they must be very widely distributed indeed. Moreover, if the contamination is acquired in this way, rather than by transmission from antecedent disease, it has to be explained how it comes about that the first few crops or generations of ticks very frequently fail to produce any fever. Why do they not pick up the infection, if it exists in external Nature, just as readily as later crops? Why is it, too, that ticks which have matured for many generations on a herd before any Texas fever has appeared, *remain, after the disease has eventually swept through it*, sure fever-producers? Some experiments have been instituted in the hope of determining these matters.

It has also to be ascertained if any other blood-sucking insects, such as some kinds of flies and mosquitoes, are capable of performing the same rôle of transmitting agent as the tick. In Australia, so far as I am aware, we have no evidence of any such thing; on the contrary, we have distinct evidence against it. But, on the other hand, a disease apparently identical with Texas fever has been observed in various countries where the presence of the cattle tick is problematical; so that the *possibility* of the disease being transmitted by some such vicarious agencies must, I think, be admitted, though it is to us a matter of small practical importance.

THE BULLOCK AND THE FEVER.

The bullock's part is quite a passive one. He is assaulted by the tick, infected by the microparasite, and tormented by the fever. Probably individual animals differ somewhat in natural susceptibility to these things, and perhaps various breeds of animals differ also, just as individuals and races of men differ in natural susceptibility to any given disease or noxious influence. But I am not aware that constitution, breed, colour, or any such circumstance has been proved to have any special protective influence; or that there is any special protective virtue in one class of country over another, *except in so far as it may be unfavourable or otherwise to the life of the tick or of the microparasite*. The cattle from all kinds of country are attacked alike when removed to places where the ticks are known to be fever-carriers. As in the case of many of the ills which human flesh is heir to, immunity to Texas fever is most safely and satisfactorily attained in early life, when tissue change is active, and vital energy and recuperative power are in the ascendant.

THE FEVER.

The fever—which is the most important element in the whole drama—results from the opposing activities of the microparasite and bullock, and is the expression of a deadly combat between the two. The microparasite is the attacking party. Having got into the blood, it invades and destroys the blood corpuscles, and causes a blockage of many of the minutest bloodvessels or *capillaries*. Perhaps, by such action, it causes a certain amount of irritation to the apparatus in the brain which regulates the generation and liberation of animal heat, and so causes high temperature. But I think more probably, and possibly in addition, it generates a poison in the blood—just as the yeast plant produces alcohol in a fermentable liquid—and that the high temperature or “fever” is due to an effort on the part of the bullock's organism to produce an antidote or counteracting substance. If it succeeds in this, it overcomes the microparasite, and holds it in perpetual subjection, and also any future parasites that may be introduced; and in this way becomes immune to their attacks. But, though it thus becomes master of the situation, it does not seem to be able to actually exterminate the invaders; they still linger in

the blood, though in a subdued and harmless condition—as far as that particular bullock is concerned. If, on the other hand, the bullock does not succeed in this, and the parasite wins, then both vanquished and victor alike perish, and the owner loses his property—though that, at any rate, is an aspect of the subject upon which, fortunately for us all, I am not called upon to say anything.

PREVENTIVE MEASURES.

Having thus, so to speak, reconnoitred the position, it remains now to consider the means at our disposal for opposing the assaults of the enemy. From what has been said, it is evident that the tick and the microparasite are quite distinct forces, either of which, singly, would be, comparatively speaking, harmless. For the microparasite alone—even supposing it existed in abundance in external Nature—might be safely disregarded, as, without the tick as an inoculating agent, it would have no means of gaining access to the blood of the cattle. And the tick alone, being unable to produce Texas fever, would be shorn of much of its terror. The strength of the attack lies in the fact that these two forces are so closely allied and linked together for purposes of evil. Hence it appears to me one of the first and most important strategical questions we have to decide is whether it might be possible to break up this nefarious alliance; and the possibility of our being able to do this must, I think, depend on our obtaining a precise knowledge of the circumstances under which, in Nature, the tick and the microparasite become associated and dissociated.

The subject is an extremely interesting one, but we have not now time to discuss it. But if it should be found that ticks only acquire the microparasite from the blood of previously infected cattle—and then only perhaps during some particular stage of its evolution, as during the height of the fever—it might conceivably be possible to prevent such an occurrence by insuring that any ticks which may spread into as yet clean areas, or the ticks now existing in places where no Texas fever has appeared, shall not have access to any contaminated animals from which to obtain the objectionable associate.

If, on the other hand, the Texas fever parasite exists in external Nature and can be picked up from the soil, grass, or water by young ticks, apart altogether from antecedent bovine infection, it is obvious that such considerations could be of no value.

The interest and importance attaching to such questions have reference, however, almost exclusively, to localities in which the tick plague is still unknown, or in which Texas fever has not yet made its appearance. And it has also to be remembered that any such scheme as that just suggested, even if feasible in theory and in fact, might still be quite impracticable under the actual conditions of Australian herds. For it would be, to say the least, extremely difficult to prevent the intermingling of contaminated with uncontaminated animals, and to limit the transportation of all cattle which might harbour the microparasite in their blood.

INOCULATION.

Putting aside, therefore, all such questions as we have been discussing, and leaving out of consideration the various means that have been adopted for limiting the spread of the ticks themselves—such as quarantine lines, medicinal agents, and dips and dressings—all of which have proved more or less ineffectual, we have to consider the means at our disposal for preventing the spread of Texas fever, or rather of mitigating its effects, and protecting the cattle against it; for so long as we have no effectual means of controlling the spread of the ticks, or of preventing them from carrying the germs of the disease, we can obviously have no effectual means of limiting the spread of the infection. All we can reasonably hope to do under these conditions—and what fortunately we can do very effectually—is to anticipate the spread of the disease by inoculating the cattle, and thus make them proof against it.

The principle of protective inoculation in general need not detain us. Broadly stated, and omitting all exceptions and reservations, it rests upon the facts: (1) That one attack of an acute infective disease confers protection against subsequent attacks; (2) that such disease can be communicated artificially by inoculation from one animal to another; (3) that the attack produced by this means is less severe and dangerous than when the disease is contracted in the ordinary way; and (4) that, like an attack of the naturally acquired disease, it confers protection against subsequent attacks. The process is subject to many modifications, but its efficacy in regard to many ills of man and beast is thoroughly established, and the success of its application in the case of Texas fever has now been very amply proven.

I would not be misunderstood, however. When I say that inoculation has been proved a satisfactory protective against any given disease, I do not mean to imply, either that it necessarily confers as complete protection as an attack of the natural disease, or that it is absolutely effective in every case operated on. That would be too much to expect, or is, at anyrate, more than the facts warrant. The *degree* of protection afforded by inoculation against any given disease is, probably in most cases, directly proportionate to the severity of the reaction produced. Take the well-known case of smallpox. A person who has passed through a severe attack of the disease, contracted in the ordinary way, is rendered immune for the rest of his life. One who has been inoculated after the old-fashioned method, directly from a smallpox pustule, is also rendered very highly immune, but probably somewhat less so than in the previous case; and one that has been vaccinated by the mild modern method with smallpox virus that has become attenuated by passing through a series of bovine animals, still less—so that the process in this case may have to be repeated at intervals; and even some few vaccinated persons may contract smallpox. In this case it is evident that the milder the inoculation disease the less is the subsequent protection. And I think it is probable that the same thing applies in other diseases. We do not, however, because of occasional failures, say that vaccination generally is a failure; on the contrary, in spite of these things, we regard it as an eminent success, inasmuch as it has practically stamped out one of our most dreadful diseases. And it is the same kind of relative—not absolute—success that I claim for inoculation as a protection against Texas fever.

Texas fever, however, differs (?) from the ordinary infective diseases in this—that the microparasite, like the corresponding organism of malarial fever, remains in the blood long after the acute disease has passed away, a circumstance which explains the effectiveness of the blood of recovered animals for inoculating purposes. Sometimes its persistence causes a chronic wasting form of disease, as does also the malarial parasite in man. More generally, however, it causes no symptoms whatever, and “recovered” cattle return, more or less quickly, to perfect health and condition. And though the survival of the microparasite in the blood is unquestionably of very common occurrence—whether it has been originally introduced by the tick or the syringe—I am not certain that this invariably happens. The most searching test—and by far the most reliable one—as to whether the blood of any particular recovered animal contains the Texas fever parasite or not, is to inject some of it into a susceptible animal, or into a number of susceptible animals, and observe if any fever is produced. Certain it is that the blood of different recovered animals varies very greatly in its fever-producing power. The blood of some such animals has been found not to have this power; from which it is reasonable to infer that it contained no microparasites. For this reason I should be inclined to recommend that only recovered animals whose blood has been actually proved by the injection test to have the requisite power of setting up fever should be used for inoculating purposes—at any rate, when the inoculations are to be done on a large scale, and cannot be easily repeated in case of failure to produce reaction. It is a very simple thing to inject a few susceptible cattle with the blood proposed to be used, and thus obtain definite information as to its suitability, or otherwise, for further inoculations.

It has to be stated, however, that marked protection—or immunity, as it sometimes called—has, in some instances, been proved to follow the injection of “recovered blood,” even when it has produced no discernible reaction. This circumstance has, I think, been more probably due to some quality or substance of an *antitoxic* kind in the blood of the recovered animal than to the presence of the specific micro-organisms. And the immunity produced has been of a “passive” kind, and therefore almost certainly of short duration. But, leaving out such exceptional cases (which suggest a most interesting field for further study), I am confident that, in a general way, the degree of permanent immunity conferred against Texas fever—as in the case of inoculation for smallpox and other diseases—is very closely related to the amount of reaction produced; and Dr. Edington has remarked the same thing in connection with inoculation for rinderpest in South Africa.

One of the practical difficulties we have to encounter—especially in the inoculation of such highly susceptible animals as aged bulls—is to produce sufficient reaction to insure subsequent immunity, without producing so much as to endanger the life of the animal. For we have as yet no satisfactory means of regulating the amount of reaction. Safety has been thought to lie in the injection of very minute doses, but this idea has not been completely substantiated. Pretty heavy losses have been reported in bulls that have been inoculated under favourable conditions on their own pasture with only 1¹/₂ cc., or about 20 drops, of “recovered blood.” If any security at all lies in small doses this quantity must therefore be regarded as above the limit of safety for such animals. Bulls have been safely and satisfactorily inoculated with only 10 drops, but this fact alone does not help us much, as the same result has also been attained in other instances where much larger doses have been used. Only careful comparative experiments on a large scale, such as might well be undertaken at the joint expense of all the colonies interested, can definitely settle this question.

I must not, however, digress into a discussion of the problems connected with this subject, and the various experiments that have been undertaken to solve them. There still, undoubtedly, remain many questions to occupy the attention of those who may be charged with the duty of unravelling—or attempting to unravel—them. In what I have said, I have endeavoured rather to lay before you the principles upon which the practice is based than to advocate it as a sort of fetish which, like a pink pill or a bile bean, is to be blindly accepted. It is perhaps hardly necessary for me to remind you that inoculation is a protective against Texas fever, not a cure for it; and that is the height of folly to postpone the operation till the disease is actually devastating a herd, and then, as some of my acquaintances have done, abuse inoculation as useless—deadly—and the cause of all the mischief.

In conclusion, may I be allowed to offer you a word of congratulation, in that from all I can gather the cattle remaining in your district are now pretty well through with the fever, and you with the trouble? Fortunately, the evils which ticks do are comparatively short-lived, and herds over which the disastrous wave has already passed are in no way permanently injured, and live and thrive and multiply as well as ever. We see this already in some of the Northern parts of Queensland, not to speak of other great cattle-raising countries where ticks are constantly present. I had lately an opportunity of inspecting one of the largest dairy herds in the Central district, which within the last two years has passed through the very severest ordeal of the tick plague, and where the paddocks are still virulently infested, so that susceptible cattle placed there contract the fever with the greatest precision—and even cattle that have been rendered immune by inoculation against the fever are greatly worried and worn down for a time when first brought into them. Yet this herd is now a very picture of health. The cows are sleek, fat, and practically tick free; and their yield of milk is, in quality and quantity, all that could be desired. They have emerged from the ordeal quite uninjured.

Looking, therefore, soberly at the facts—before and after—we have, I think, to recognise that though the tick and the disease which it so often conveys are very great evils, and have been terribly disastrous to individual owners and to whole districts, they will not, as by some at one time feared, prostrate or in any way permanently injure the cattle-raising industry of Queensland; that they are indeed less important than the tuberculosis trouble which so grievously affects the herds in many European countries, and from which, unfortunately, even Australian cattle are not exempt. There seems, also, good reason to believe that the worst of the trouble is over, and that the disastrous consequences which have attended the spread of the ticks in this and other districts will be largely mitigated, in other parts which may yet be invaded, by a more general knowledge of the natural history of the disease, and a more timely adoption of those protective measures which we have been considering.

THE TUBERCULIN TEST.

FURTHER OBSERVATIONS ON THE ST. HELENA HERD.

By C. J. POUND,
Director of the Queensland Stock Institute.

In a previous report I stated that two animals—viz., the yearling bull Young Randwick, and the two-year-old heifer Hessie—gave a decided reaction to the tuberculin test, but in consequence of there being other conditions present, which might possibly cause a temporary rise of temperature in any animal, these two animals could only be looked upon as doubtful cases of tuberculosis until they were submitted to the test again.

Exactly five weeks after the first test, the above two animals and the six cows that reacted previously were subjected to a second testing as follows:—The eight animals were brought quietly from the isolation paddock and secured in their respective stalls. The normal temperatures were carefully recorded at 2 p.m. and 6 p.m., and then each animal was injected behind the shoulder with the standard dose of tuberculin, and the reaction temperatures carefully recorded every three hours next day from 6 a.m. until 6 p.m., as shown in the following table:—

Name of Animal.	Temperatures.							
	Before Injection.		After Injection.					
	13th October.		14th October.					
	2 p.m.	6 p.m.	6 a.m.	9 a.m.	11 a.m.	1 p.m.	3 p.m.	6 p.m.
Dinah	103·5	102·8	102·8	103·8	104·1	104·7	104·2	104·1
Annie	102·5	102·1	101·	104·4	103·3	104·	103·8	103·6
Bluebell	102·4	102·8	102·	102·9	102·3	103·8	102·1	104·2
Floss	102·2	101·7	101·5	104·8	104·	103·9	104·5	104·2
Diana	102·3	102·3	102·	102·6	103·6	104·	102·9	
Snowdrop	102·6	102·7	101·2	102·2	103·1	104·8	102·8	102·6
Hessie	103·6	102·7	104·6	104·9	104·2	104·3	103·2	
Young Randwick ...	102·4	102·5	105·	105·2	104·1	104·8	104·2	

It will be noticed that each animal gave a very decided reaction, thereby proving a fact of the utmost importance—viz., that tubercular animals will react in a most pronounced manner to the tuberculin test a second time within five weeks.

NOTES ON THE CONDITION OF THE EIGHT ANIMALS.

Since the first testing, the big roan cow "Diana" gave birth to a fine healthy-looking male calf, which unfortunately, through some misunderstanding, was killed when only a few days old; it is, however, satisfactory to know that the lungs, glands, and internal organs of this calf were perfectly sound and healthy, while the mother (from the time of calving) was noticed to lose condition considerably; the milk yield was very small and poor in quality in consequence of the progress the disease had made in each of the four quarters of the udder. The other five cows had shown no alteration whatever in their physical condition, while the young bull and the heifer had both made very decided improvement—in fact, both looked the picture of health. With the exception of Diana, there was nothing to indicate that any of the animals were tubercular in the slightest degree.

After the testing, the five cows—Dinah, Annie, Bluebell, Floss, and Snow-drop—were returned to the isolated paddock; while the newly-calved cow Diana, the heifer Hessie, and the little bull Young Randwick were killed, and on *post-mortem* the following appearances were revealed:—

Diana.—Lungs filled with small tubercular deposits. Bronchial and posterior pharyngeal glands not enlarged, but caseous milliary tubercles on the mesentery. Spleen mottled. All four quarters of the mammary gland enlarged and tubercular.

Hessie.—Lungs and bronchial glands apparently healthy. The mesenteric glands were tubercular, while on the mucous membrane of the intestine there were several large tubercular ulcers.

Young Randwick.—Large caseating patch deeply seated on the inner aspect of the right lung; also numerous milliary tubercles on the dorsal surface of both right and left lungs. Bronchial and posterior pharyngeal glands enlarged, and showed small tubercles on cut surface. Numerous small caseating tubercles all over the liver. Mesenteric glands enlarged, indurated, and highly pigmented. Throughout the small intestine there were numerous ulcerating tubercles on the mucous membrane.

There can be very little doubt that the lesions found in the intestines of the young bull and the heifer were the result of ingesting some virulent tubercular material, and derived from either one or both of the following sources:—
1. By being fed when young on the milk from a cow suffering from tubercular mammitis (probably Diana's milk). 2. By ingesting some tubercular expectoration which had been coughed up into the feed-boxes or mangers from one of the cows with infected lungs.

It should be specially pointed out that the application of the tuberculin test is only one factor in eliminating tuberculosis from a dairy herd; therefore every possible means should be afforded for adopting the other equally necessary preventive measures—*i.e.*, after testing the entire herd periodically (every six months), *viz.*:—

- (1) The reacting animals should be separated as far as possible from the healthy.
- (2) Kill all the evidently sick animals immediately.
- (3) Rear the calves of the cows which react but otherwise appear healthy or at least only slightly attacked.
- (4) Remove the same immediately after birth from the infected sheds or yards; place them in the specially-set-aside healthy division; and protect them from further infection, especially from feeding with suspected milk.
- (5) Following the lines adopted by Prof. Bang, it is advisable to sterilise all milk intended as food for calves.
- (6) Carefully disinfect the interior of the various sheds used for housing cattle, first, with 1 in 1,000 bichloride of mercury, and afterwards with limewash mixture containing 1 in 1,000 bichloride of mercury.

If the above regulations are strictly adhered to, I am of opinion that the value of the St. Helena herd will be very materially enhanced; and, further, I have no hesitation in stating that within a very short period all the cattle could be, practically speaking, guaranteed free from tuberculosis.

I sincerely trust that this experiment may prove of value and be an object lesson to the dairy farmers throughout the colony, precisely in the same manner that similar investigations after publication have been successful in other countries, notably Denmark, France, and throughout the United States.

Vegetable Pathology.

FRUITLET CORE-ROT OF PINEAPPLE.

By HENRY TRYON, Entomologist.

(PLATES LXVIII.—LXXI.)

THIS affection of the pineapple is by no means of uncommon occurrence, at least in Southern Queensland, and occasions sometimes considerable loss to the grower of that fruit, especially during the winter months of the year, when pineapples are as a rule in small supply, and accordingly command high prices. Moreover, fruit exhibiting it has already found its way to southern markets, where its presence has formed a topic of remark in both official and other quarters.

SYMPTOMS.

As may be inferred from the title bestowed by the writer on the disease, it is the fully-grown fruit that more especially manifests its presence, though this may happen before the latter is as yet ripe.

PRICKLY QUEEN.—In the case of the so-called Prickly Queen, the variety both more exclusively cultivated and at the same time especially subject to its attack, its occurrence is characterised by the following general features:—

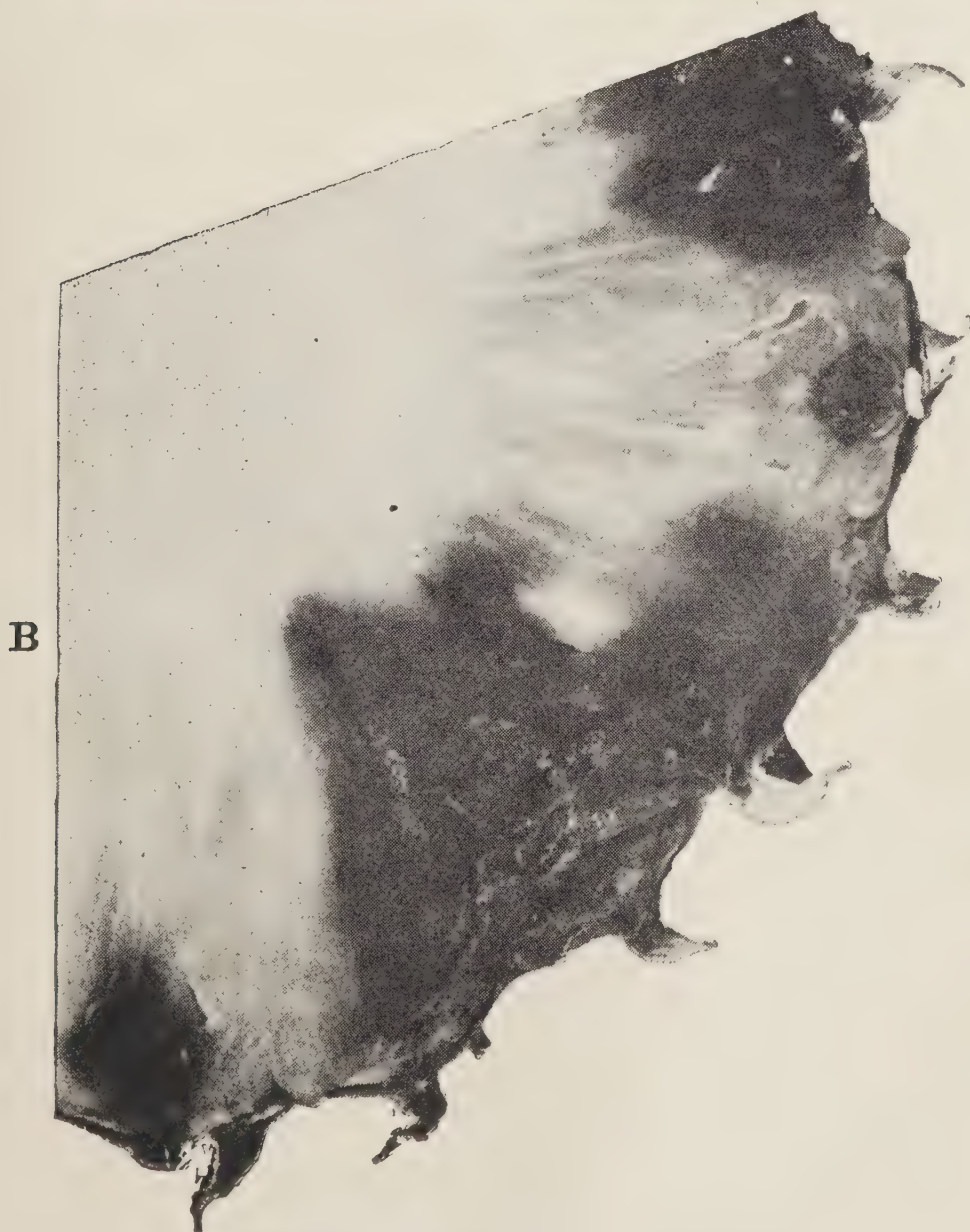
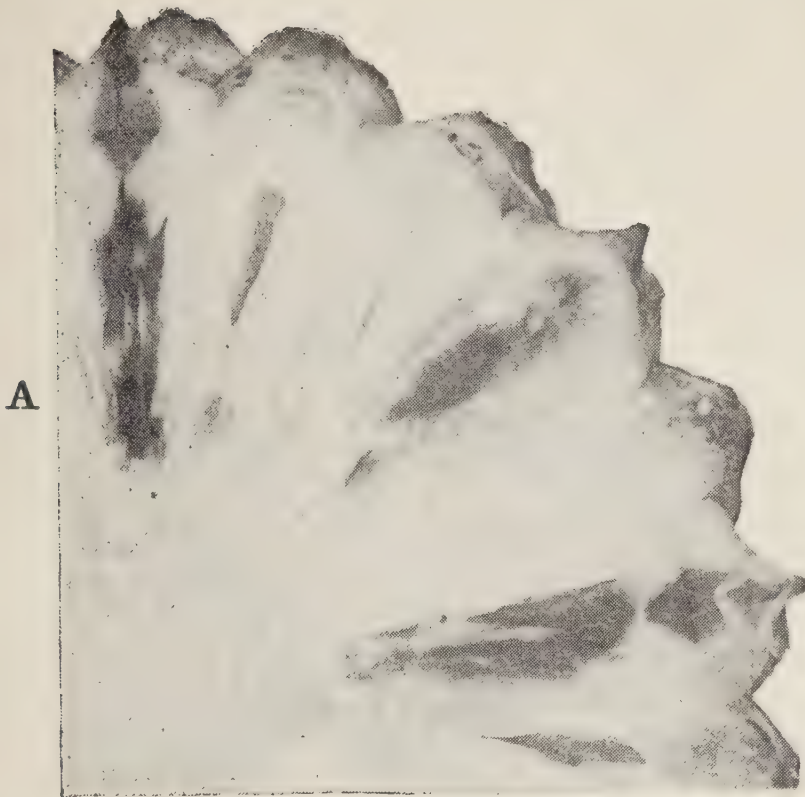
External.—The fruit as judged by external appearances ripens unevenly. Although its symmetry be preserved, particular segments or groups of segments occur here and there, that remain pale-green; whilst the entire surface, with these exceptions, has assumed a general hue characteristic of ripening or indeed ripe fruit.

Internal.—On cutting the fruit across (*vide* Plate LXVIII., A) will be observed in greater or less number well-defined dark-brown elongate markings or areas of decayed tissue, that extend to a variable length from a short distance from the outside towards the centre. These differ greatly in shape, as well as both in length and breadth; but owing to their colour and dimensions are always very conspicuous. It is found also that they occur immediately opposite the pale-green surface markings already alluded to; but that they may exist in a partially developed condition without any such external indication of their presence. The central axis does not manifest any abnormal change.

On separating the compound fruit into its component fruitlets, it will be found that the affection is almost invariably limited, in the case of each patch of discoloured tissue, to individual examples, in connection with which it occurs isolatedly, although in some instances where very pronounced it may have apparently extended from one fruitlet to its immediately adjacent neighbour.

Should the section pass lengthwise through the centre of these fruitlets, or if, as is preferable, individual diseased ones are dissected out and similarly cut through, the undermentioned appearances are revealed, premising that a healthy fruitlet should present the following structural features (*vide* Plate LXX., Fig. A 1):—An upper oval cavity or chamber (a), completely

Plate LXVIII.



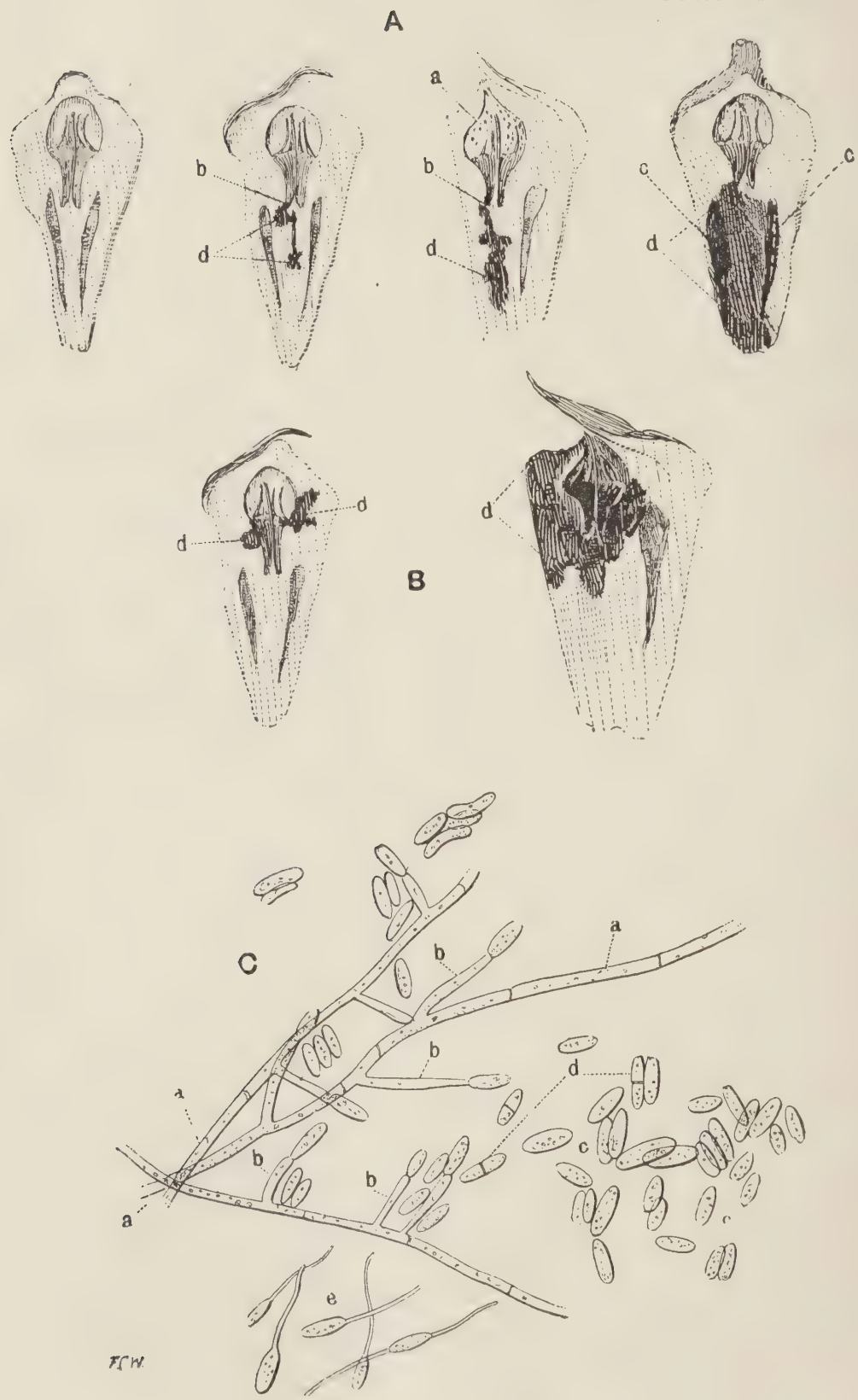
PINEAPPLE FRUITLET CORE-ROT.

Plate LXIX.



PINEAPPLE FRUITLET CORE-ROT.
(Smooth-leaf Pine.)

Plate LXX.



PINEAPPLE FRUITLET CORE-ROT.
(Fruitlets and Fungus.)

closed above by the imbricate swollen sepals, and an external fleshy bract ; and containing the already dried-up essential organs of the flower, comprising the three stamens with their filaments that arise from a level some distance up the wall of the cavity, and the compound thread-like style springing from the centre of its base. Immediately below this cavity is the so-called ovary of the fruit, in connection with which may be remarked a broad central fleshy axis (e), to lateral extensions of which—or placenta—are attached undeveloped ovules that occupy special elongated seed-cavities (c)—or locules—that extend on each side of this placental axis, and between it and the outer wall of the fruitlet. The appearances alluded to, under the circumstances mentioned, presented by a diseased fruitlet are as follow (*vide* Plate LXX., Figs. A 2, 3, 4) :—Areas of dark-brown—apparently rotten—tissues occur in the solid parts below the cavity or chamber, being always more pronounced in the central or axial portion, and these are found extending more or less towards the base of the fruitlet. If the malady has but recently commenced in the fruitlet, or has been arrested in its development, only a single small spot (or perhaps two) of discoloured tissue is observable. This (b) invariably occurs immediately beneath one or other of the three small depressions surrounding the base of the style in the floor or base of the outer fruitlet cavity, and that probably originally served the purpose of nectaries in the pineapple flower ; or again, less frequently, along the course of a line of tissue, immediately continuous below with the base of the style. As the disease progresses, the whole of the abovementioned placental axis, or “core,” becomes gradually involved in decay,* the brown discolouration even extending often to the outer walls of the fruitlet, and involving alike placenta and ovules. Moreover, as the dark-brown discolouration develops, the seed-cavities or locules of the ovaries become filled with a delicate white mould that is seen to have sprung from the decayed tissue that now forms—in part, at least—their walls.

In affected pineapples, fruitlets exhibiting the symptoms described vary greatly in number ; moreover, in the same fruit the individual fruitlets implicated by the disease manifest it in different degrees of development at one and the same time.

SMOOTH-LEAF.—The Smooth-Leaved Pineapple, otherwise known as the Cayenne variety, is less commonly affected by a “core-rot” disease than is the foregoing kind. It may be added also that in so much, however, as the symptoms attending its presence differ somewhat from those by which the affection in the Prickly Queen is characterised, the absolute identity of the two forms, though presumed, cannot as yet be definitely affirmed. These symptoms are as follow (*vide* Plates LXIX., LXVIII., B, and LXX., B):—

External.—The individual sections of the surface of the fruit, or fruitlets, develop a dark coffee-brown colour denotive of decay—an alteration that seems to commence (except when the result of an extension of disease from a neighbouring individual), from external symptoms, at the central portion of the fruitlet and to proceed towards its outer margin. Associated with the pronounced change of colour, there is a more or less conspicuous shrinkage, as decay proceeds. The bracts also are involved in these changes. When, as often happens, several contiguous fruitlets become so affected, the pineapple may present large conspicuous brown patches that may connect with one another all around it, so that a large portion of it may become involved. At first the portion of the fruit that is so conditioned preserves its regular contour, but during the progress of the disease, as shrinkage supervenes, deep fissures may arise amid the sections, and occasionally even two or three affected fruitlets may be partly sunken in the more or less extensive pits that thus arise. The affected fruitlets at first exhibit no outward indication of any fungus growth, but in the abovementioned pits and fissures a green mold may be ultimately noticeable. The tuft of leafy tracts occurring at the top of the fruit presents no abnormal feature. (Plate LXIX.)

* Hence the appellation “core-rot” bestowed by the writer on this particular disease.

On cutting the affected pineapple across, it is to be observed that the central axis presents a quite healthy appearance. The same remark applies to the general tissue beyond the immediately affected parts. But the portion underlying the externally altered surface is already dark-brown and decayed, the area so changed corresponding in extent to that of it. This discoloured area may already form a patch continuous with the outside surface of the pine externally, and pass inwards to a varying depth of from $\frac{1}{4}$ -inch to $\frac{1}{2}$ -inch. The inner border of this area is very clearly defined, though exceedingly irregular. In addition to this, there may occur without any corresponding surface area of decay, and well within the margin, isolated patches of discoloured tissue that vary greatly in size but agree in being restricted to individual sections. So also on cutting across a fruit that has not as yet developed any external indications of the disease, or but obscure ones only, similar islets of affected tissue are revealed, from which it may be concluded that the malady commences independently, but not simultaneously, in separate fruitlets. (Plate LXVIII., B.)

On dividing lengthwise a series of these fruitlets, so as to display the existence of the disease in its successive stages, it will be found that the features presented do not quite correspond to those described as occurring in the Prickly Queen variety of pineapple. Thus the malady in the variety under notice commences with the formation of one or two small patches in the tissue, immediately beneath that portion of the base of the cavity or chamber that occurs below the level at which the stamens are inserted, and, though it ultimately invariably extends downwards into the ovary proper of the fruitlet, it tends rather in the first instance to invade the tissue occurring laterally to its point or points of origin, and to pass upwards into the fleshy sepals (which never happens in the case of the Prickly Queen), with the result that the diseased area becomes ultimately at length continuous with the outer surface of the fruit. (Plate LXX., B d.) It is considered, however, that these distinctive features are in accord with the marked structural differences, in matters of detail, that exist between the fruits and fruitlets of the two varieties mentioned, and which need not be now detailed. The further fact that the special fungus associated with the diseased condition is not identical with the one met with in this relation in the case of the Prickly Queen variety, but is the *Penicillium* that is derived from the dead and dried-up essential organs of the flowers, in which position it occurs in the fruitlet cavities of both varieties alike, is not, however, so significant as it might at first appear, seeing that they are both saprophytic fungi, and therefore secondary in their relation to the disease; whilst at the same time also the fact that they are different, and have their separate physiological characteristics, will in a measure account for the difference in symptoms that has been described.

CAUSE.

Causes Hitherto Assigned.—(1) Prior to this disease having been made the object of special inquiry on the part of the present writer, it had been regarded by him—as already reported—as being “a form of natural decay affecting fruit subjected to conditions inimical to the progress of normal ripening”; the fact that it had been “encountered for the most part in pineapples produced in the ‘off season’—i.e., during the winter and early spring months—and also in such fruit as had been (apparently) prematurely harvested,” being suggestive of such explanation. This theory as to its origin has, moreover, since proved to be untenable. (2) From an examination of affected examples of the Prickly Queen pineapple alone, especially having in view the fact that a special fungus is invariably present in connection with the portions of of discoloured tissue observable, it might be again inferred that the invasion of healthy tissue by this organism was the primary cause of the disease. This is the explanation as to its origin adopted Dr. A. A. Brown, M.B., Ch.B., of the Stock Branch of the Agricultural Department of Victoria, as would appear from his able report on “Disease in Pineapple,” written in 1896, of which a copy in manuscript has been obligingly placed at the disposal of the writer.

In this memoir Dr. Brown states as follows:—

On cutting across the fruit the staining of the tissue is at once noticed; the staining may be of a brown colour—of a lighter or darker hue—or it may be almost black and stretching from the scaly exterior to the centre. In the cavities beneath the bracts a whitish-greyish mould may often be noticed. The microscope reveals the cause of the condition noticeable. Sections of the discoloured patches were made with a freezing microtome and examined with a microscope. In some instances the cells (the ultimate constituents of the fruit) were seen full of spores of fungi, and in other instances hyphæ interlacing as well as sporangia could be seen. The microscope revealed that the condition is a disease caused by the presence of a fungus belonging to the group *Mucorini*. Cultivations of the spores on slices from a healthy pineapple resulted in the production of hyphæ interlacing to form mycelia, and of sporangia full of spores. Zygosporos were not seen. The fungus seems to be identical with *Mucor racemosus*. Fungi belonging to the group *Mucorini*, when growing submerged in a fluid medium, result in the hyphæ breaking up into spores. A pineapple being very succulent is practically a fluid medium; hence after the fungus has continued growing some time it breaks up into spores, and the sections show great spore formation. The fungus is capable of exciting spirituous fermentation. The sugar present in the fruit is by its action broken up into alcohol and carbonic acid. In some instances in advanced cases on cutting across the fruit, a spirituous odour is easily detected. The change in colour observed is due to the chemical changes wrought by the fungus in the protoplasm of the fruit.

Pineapples under cultivation are, as a rule, perpetuated by planting the tops of ripe fruits, and also by planting the suckers. It is rare for pineapples to be raised from seeds, and, moreover, it is seldom that the seed of cultivated pineapples reaches maturity.

Fungi may enter fruit in four ways—1. Fungus may enter the flower, and go on developing with the progressive growth of the flower to form the fruit. 2. Fungus may enter through the stigmata (natural openings in the surface of the fruit). 3. Fungus may penetrate through the firm membrane of epidermal cells. 4. Fungus may enter through a wounded surface.

Having once become diseased with fungi, it is quite clear that the tops and suckers of such pines should not be used for the production of fresh fruit.

In the course of this inquiry in no instance has a fungus that might be ascribed to the genus *Mucor* been found present in or upon the diseased and discoloured tissue, nor indeed any of the species possessed of internal spores as are the members of the Mucorineæ, nor again “sporangia.” On the other hand, the brown tissue invariably contained the mycelia or spawn threads, from which arose the “whitish-greyish mould” previously alluded to, and mentioned by Dr. Brown also, as occupying the cavities of the fruit. Again, in no instance was a special alcoholic fermentation remarked other than occurs in ordinary ripe pineapples, and such evidently eventuated under the usual conditions determining this event in their case, including the presence, numerical increase, and development of the alcoholic ferment-organism that occurs in this class of fruit. However, in the case of fruit affected by “core-rot,” fermentative changes are, as a rule, retarded. Further still, a pure cultivation of the organism is incapable of producing alcoholic or indeed any other fermentative change.

With regard to this special mould fungus, it is concluded that it is a species of *Monilia*, Persoon, allied to *Monilia candida*. It may be described as under:—

Monilia, sp. (Plate LXX., Fig. C a-e). Hyphæ procumbent, colourless, but containing granular matter, indistinctly septate, usually about $23\ \mu^*$ in diameter, with remote elongate branches arising singly at an angle less than a right angle. Spores elongate, parallel-sided, round at each end, continuous, or very rarely 1-septate, colourless, containing unequal granules that in young spores tend to be segregated in two nuclei, averaging from $13\text{--}16\ \mu$ long (but occasionally only from $5\text{--}11\ \mu$) $\times$ $2\text{--}3\ \mu$; occurring terminally on sporophores of almost equal width with the hyphæ, arising almost at a right angle therefrom, and from $16\text{--}27\ \mu$ long, although occasionally only $9\ \mu$. On these supports the spores arise terminally with scarcely any constriction. They are rapidly formed, but are quickly caducous. Accordingly, twenty or more lying side by side may occur adjacent to a single sporophore. Germination is by sprouting almost always at one end of the spore; but the occurrence of septate spores points to possible rare development by fission also.

* One μ is about equal to $\frac{1}{2500}$ inch.

On washing out the upper cavities (Plate LXX., Fig. A a) of healthy pineapple fruitlets with sterilised water, the spores of a fungus, that proves to be identical with those of the foregoing, are to be met with. These will germinate in fresh pineapple juice. In an attempt, however, to artificially produce the disease by sowing living spores, it will be found that only the fourth method—mentioned by Dr. Brown—can, as a rule, be successfully availed of—that is, the “fungus may enter through a wounded surface.” In order, therefore, that the disease may originate under natural conditions, it is necessary—or nearly always so—that there occurs as a primary condition some agency by which such injury may be affected; otherwise the fungus may be present—as often is the case—without any disease occurring, or indeed any abnormal feature whatever being remarked.*

On examining the cavity of the fruit that contains the essential organs, it will be noticed that the basal portion below the level at which the stamens originate is of a brownish colour, and is irregularly, but shallowly, fissured. This fissuring, however, occurs invariably in healthy fruitlets; the fissures are rendered impervious to the developing spores of the *Monilia* owing to an alteration in the condition (suberation) of the superficial layer of tissue-cells that they expose; and, moreover, the disease does not commence where they are met with. Hence they must be dismissed as possible ports of entry.

As to the occurrence of special agencies occasioning injury. It may be stated that this cavity also serves as the temporary or permanent home of many forms of animal life, almost all of which inflict mechanical damage of one kind or another. (1) The caterpillar of a diminutive moth (? Fam. Tineina) not infrequently occupies it, in order to consume the stamens and pistil that it gnaws right down to their points of origin. (2) An occasional Mealy Bug (*Dactylopius bromeliæ*) may have become imprisoned in it, having entered probably before or soon after the flower was shed. Similarly a species of *Thrips* may occasionally occur therein. These insects are, however, found in both healthy and diseased fruitlets alike, but usually in those that are quite sound, and, moreover, no disease seems to ever attend their presence.

The more frequent denizens are, however, various species of mites. (Plate LXXI.)

Now one of these mites it is that inflicts the injury to the fruitlet, that is the essential precursor to the disease, and, through the medium of this, infection by the fungus described takes place. It must accordingly be regarded as being the originator of the disease. This mite belongs to the genus *Tarsonemus*, founded by Canestrini and Fanzago in 1876. It is of minute dimensions, and cannot be seen without the aid of the microscope. Figs. 1 and 2 of Plate LXXI. represent male and female individuals as they appear when suitably prepared and magnified, and will serve to generally represent them. These illustrations may, however, be supplemented by the following technical description:—

Tarsonemus ananas, sp. nov.

Male.—Oval in shape, with the hinder margin rounded. A narrow linear groove crossing the body immediately behind the second pair of legs divides it into two unequal parts. In front of this line it narrows to the fore-border of the head, and somewhat widens behind it. It measures from 173μ to 188μ in length, and from 75μ to 76μ in extreme breadth, being somewhat smaller than is the female. The head and sexual (?) organs, that terminate the body in front and behind respectively, are almost identical in form and size, being ovate and slightly excavated at the base and terminally rounded. The latter, however, is somewhat the larger of the two. Two short setæ occur on each side between the second and third pairs of legs, and one on each side of the sexual organ. The first pair of legs extend beyond the rostrum, and the second pair almost equal them. Both they and the third pair are composed of five joints, and are nearly identical in form. The first pair each terminate in a single claw, and have three small fusiform sensory bodies on the outer borders of their last joint or tarsus. The second and third pair are two-clawed, and the former have apparently one sensory club only on their tarsi; each has a few—one or two of which

* This is agreeable to the discovery of C. H. Peck with regard to a closely allied fungus—*Monilia fructigena*, Pers.—that “the hyphæ are incapable of penetrating the unruptured epidermis of various fruits.” (Vide “Journal of Mycology,” vol. vii., p. 164, 1892.)

are rather long—outwardly directed setae on their four distal joints. The third and fourth pairs of legs extend far beyond the posterior border of the body. The legs constituting the fourth pair are very robust. Their first joint is broader than long; the second is rather more than twice as long as broad, and is furnished on the inner face with a stout, sharply pointed tooth-like expansion, and with a short terminally widened tactile bristle at the extremity of the joint beyond it; the third joint has a longer, stout, backwardly directed seta on its dorsum; the fourth joint is very short, and terminates in a single, stout, slightly curved, gradually pointed claw. The epimera of the first pair meet at an angle at the middle line, and then form a narrow longitudinal keel that extends beyond the origin of the second pair of legs. The epimera of the third pair conjoin those of the fourth pair internally, and the four together are considerably and equally advanced in front.

The Female.—Plate LXXI., Fig. 1. This is elongate-oval in shape, being more than twice as long as broad. It measures 241μ in length, and 075μ in breadth. The head occupies less than a seventh of the total length. There are two long setae, widely separated, opposite the origin of the second pair of legs on the back, five lateral shorter ones on each side, three of these occurring between the second and third pairs of legs, and two behind the fourth pair, the hindermost being nearly terminal. Between the first and second pairs of legs there is a fusiform bladder-like organ. The two anterior pairs of legs generally resemble these members as occurring in the opposite sex; the two posterior, however, are widely different. The third leg has the second joint long and robust, and applied longitudinally to the under surface of the body; the third joint is also considerably lengthened. The fourth leg has its first joint very short, its second and third joints linear; and the latter, which is less than a third the length of the former, terminates in two appendages, one of which is acicular, the other twice the length of this—a long curved hair that gradually becomes exceedingly fine. The sexual apparatus occupies a broadly oval space between the two hinder pairs of legs, and comprises a longitudinal fissure met in front by two backwardly divergent arcuate lines.

The Larva.—The larva measures 214μ in length, and has three pairs of legs only. Crossing the back behind the third pair of legs are two divisional lines separating from the cephalothorax a posterior and anterior segment, whereof the latter is the longer. The anterior of these segments bears a transverse row of three stout backwardly directed bristles. The posterior segment has also on its dorsum two bristles more than twice the length of the preceding, and terminal ones of about equal length that are backwardly and outwardly directed. The back is also finely grooved, there being a group of transverse striae behind the second pair of legs, and longitudinal ones extending backwards from it. The three pair of legs closely resemble one another; the first pair also are apparently two-clawed as are the others.

The Egg.—Not identified. It may be presumed, however, that it is elongated and relatively very large. (Those of *T. buxi* being stated to measure in length a third of that of the mature acarus.)

This *Tarsonemus* Mite is met with not only in the outer cavities of the pineapple fruitlets, but also in other parts of the plant; for example, on the stem of the fruit, as well as deep between the white bases of the leafy bracts forming the tuft at its free or upper end. It probably nowhere occurs in large numbers, but it must be borne in mind that its small size (it would take 149 males placed end on in succession and touching one another to reach the extent of a single inch) and colour are such as to render its detection a matter of more than ordinary difficulty. It apparently habitually shuns the light, and consequently penetrates the innermost recesses accessible, in accord with the antipathy that this act evinces, especially when suddenly exposed. When occurring within the fruit, it commonly, but by no means exclusively, resorts to the depressions—three in number—that are met with around the base of the style at the bottom of the anterior chamber.

With its styliform mandibles it probes the tissue, in order apparently to imbibe the juice that this affords. This action on its part results ordinarily in the appearance of minute brown specks, and no further damage. Such marks are often discernible on the inner wall of the fruitlet cavity that it inhabits, and are represented on Plate LXX. (Fig. A 3 a). They may be again sometimes met with on the inner faces of the sheathing bases of the leaves. One portion of the fruitlet is very liable to experience injury from its method of feeding when the *Tarsonemus* is within the anterior chamber thereof. This is the loose

succulent parenchymatous tissue that is immediately continuous with the thin floor of the chamber, and that forms in proceeding downwards the so-called placental column and placenta of the ovary; especially (1) that part of this that is beneath the abovementioned three depressions at the base of the style, and (2) the almost open central line (the so-called placental axis of botanists) that is continuous with the narrow channel enclosed by the three conjoined styles that form the pistil.

On dividing longitudinally a number of fruitlets so as to expose to view different stages in the development of the disease, one will remark that the "core-rot" invariably commences as a small spot (often a mere speck) not only immediately beneath the chamber, so often alluded to, but precisely at the sites mentioned as being especially vulnerable; and that as the malady progresses it proceeds downwards from these sites into the placental column and placenta (to which the seeds are attached), along the central or placental axis, or along narrow tracts of tissue that terminate outwardly in one or more of the abovementioned three depressions at the base of the style. (Plate LXX., Figs. 2, 3, 4.)

This is explicable when one appreciates the fact that the spores of the *Monilia* fungus—since they are so often naturally present in the fruitlet cavity, as has been before stated, and since, as has already been observed, they germinate readily in fresh pineapple juice—can gain access to the tissue at these spots where the *Tarsonemus* Mite has been prosecuting its feeding habit. Once established at these seats of injury, the further development of the fungus and the chemical changes that are a consequence of its growth proceed downwards into the tissue along the above-mentioned tracts—as lines of least resistance—in especially suitable tissue, until eventually almost the entire ovarian portion of the fruitlet becomes affected, and the fungus itself develops reproductive organs in the loculi or seed cavities, filling these with hyphæ and myriads of, for the most part, free spores. Chemical change in the fruit-tissue manifests itself, amongst other ways, especially, by the appearance of (1) a dark-brown discolouration that attends the growth of the fungus from the very outset; and by (2) a retardation in the maturation of the fruitlet as a whole (hence the green patches occurring externally on affected pineapples); those special transformations in the constituents of unripe fruit that constitute the ripening process being apparently temporarily inhibited.

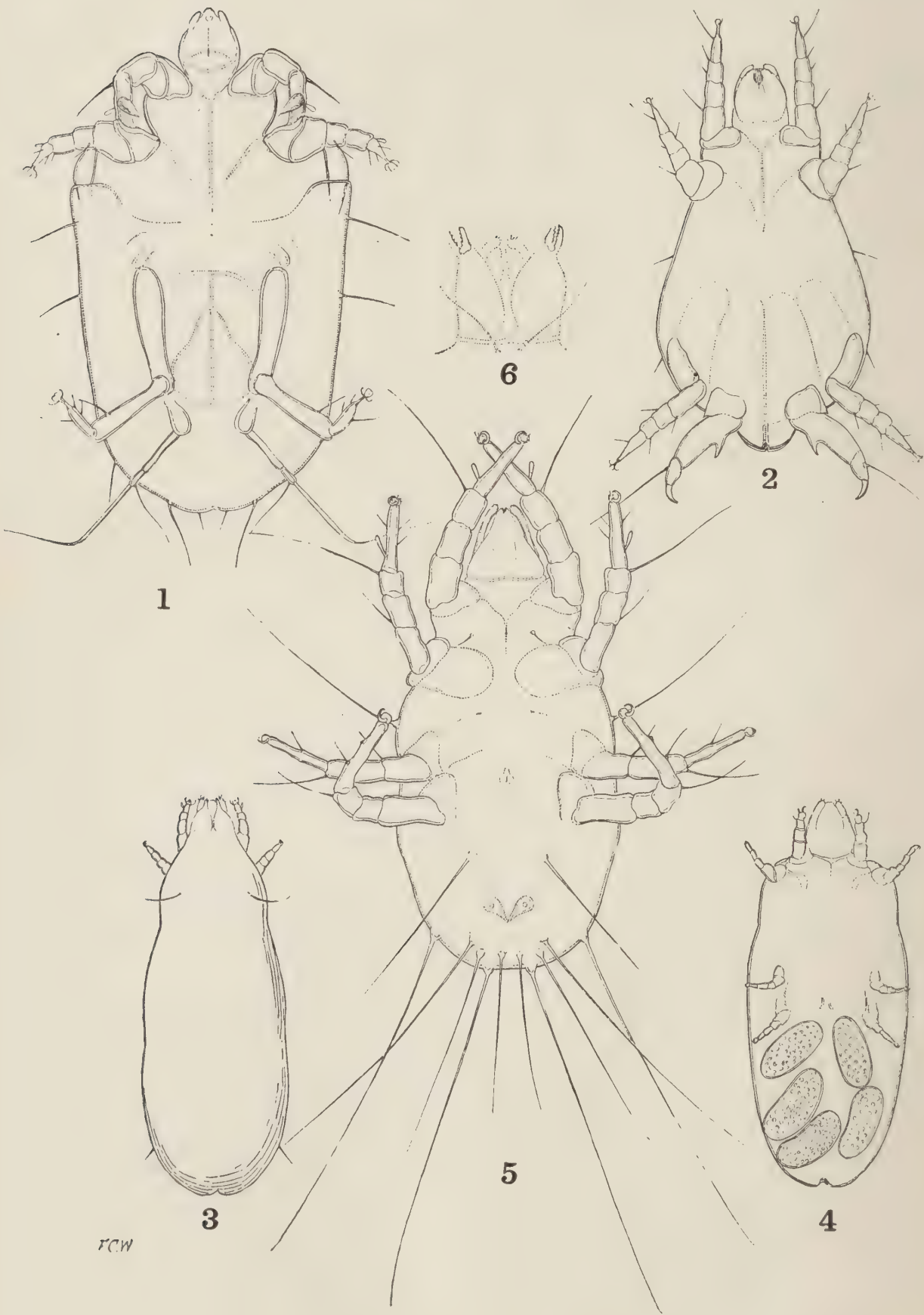
It would, moreover, appear that the latter special chemical transformations and the changes constituting the disease are directly antagonistic, and that when, as during the summer months, the former are intensified—as shown in the reduced period occupied in ripening—the latter cannot proceed. And this may be the explanation of the fact that little core-rot is remarked during the season of the year attended to. In winter the reverse condition obtains, the ripening process is protracted, and hence the prevalence of "core-rot."

The disease described on page 459 as affecting the fruit of the Smooth-leaved Pineapple presents characteristic differences, as has been already remarked, as compared with that occurring in the Prickly Queen variety. It does not commence exactly in the same position in the fruitlet; it involves the decay of another portion of it, and it is associated with a distinct fungus. This is a species of *Penicillium* otherwise found occurring almost always upon the dead and dried-up stamens and pistil. In so much, however, as it develops a prolific growth, it may early mask the external manifestation of the *Monilia*. But nevertheless accordingly, although Mites—both *Tarsonemus* and *Tyroglyphus*—have been found associated with it at the time of its very commencement, it can only be presumed that the explanation above given for the "core disease" in the Prickly Queen variety will apply also to it. However, the two diseases, if not identical, are certainly closely analogous.

ACCIDENTAL CAUSES.

In addition to the *Tarsonemus* Mite that has been shown to perform such an important rôle in connection with the origin of the disease, there are other acari also that occur with more or less constancy within the cavities affected

Plate LXXI.



PINEAPPLE FRUITLET CORE-ROT.
(Mites.)

fruitlets, as well as elsewhere upon the pineapple plants. These mites, with the exception of the one to be last mentioned—that is, carnivorous and predatory—habitually feed upon moulds, as has been determined in the course of this investigation by examining the contents of their alimentary canals. There is, however, some evidence that they may casually co-operate with the *Tarsonemus* Mite in determining disease. They are all endowed with very effective chelæ (or pincer-ending mandibles) that are employed not only in mowing down mould fungi, but also in cutting into decaying tissue, and these exceptionally also damage that which is sound. Moreover, the mite described as *Tyroglyphus ananas* frequently transports fungus spores that adhere to the long finely ciliated bristles with which its body is endowed, and two of these even extend forwards over the tips of the mandibles. Again, the second-mentioned mite—that is systematically related to the foregoing—has been observed to carry fungus spores within the pulvillus or pad, that sleeve-like surrounds the single claw with which each leg is terminated. But were it not that these considerations endow them with importance in connection with the present memoir it would be necessary to describe them, to the end that they may not be confounded by future inquirers with the *Tarsonemus* Mite itself. Amongst these additional mites the following may be particularised :—

1. Small brown individuals, referable to the family Oribatidæ; very much larger than any of the other mites particularised, and of a deep-brown colour. They are readily discernible by the naked eye. They feed upon the small mould-fungus—*Penicillium* species—that is almost invariably met with, as has been already stated, alike in healthy and diseased fruitlets upon the dry and shrivelled-up stamens and pistil. Regarding them and their habits, it may be further added that nothing has been observed from which it might be inferred that they ever injure sound and healthy plant tissue.

2. A fungus-eating, elongated, oval-shaped, white-coloured mite endowed with but sluggish movements. This is a member of the Tyroglyphidæ, but the precise genus that it represents is as yet undetermined.

This mite has the legs and mouth-organs of a pale-brown colour. The egg-bearing female is represented on Plate LXXI., Figs. 3 and 4, showing respectively its under and upper surface. In this sex the body is very elongate, measuring $675\ \mu$ (or $\frac{25}{1000}$ inch) in length and $253\ \mu$ in breadth, and has a constriction on each side at a short distance behind the second pair of legs. It is also almost entirely glabrous, but there are two bristle-like hairs on the upper surface, anterior to the constriction. Its eight legs are each very short—those constituting the first and second pairs being $10\ \mu$, and those the third and fourth pairs $8\ \mu$ long. The latter two pairs not extending beyond the sides of the body. They are stout and composed each of five nearly equal joints, and bear a single terminal claw, with an apparently lobed sleeve-like pulvillus. The head is oval with a jointed palp at each side, the upper surface being occupied by two large chelate mandibles.

The eggs are very large, but few in number, not more than five or six constituting a batch. They are oval in shape, and are slightly flattened on one side. They measure $130\text{--}140\ \mu$ in length and $60\text{--}70\ \mu$ in breadth.

3. A fungus-eating, uniformly whitish-coloured acarid related to the common Mite of Cheese (*Tyroglyphus siro*, Linn.). This is figured on Plate LXXI. (fig. 5). Although its food largely consists of *Penicillium* mould, as is the case with Nos. 1 and 2, it is suspected to occasionally injure the fruitlet also by biting its walls with its formidable pincer-like jaws (*vid.* Fig. 6). Moreover, it appears to have been hitherto undescribed.

Tyroglyphus ananas, sp. nov. (Plate LXXI., Fig. 5.) Resembles in form and clothing *T. siro*, Linn., and *T. longior*, Gerv.; but in the male sex appears to be invariably very much smaller than either, and in the female one of intermediate dimensions. The mandibles (Fig. 6), are very large; those of the male—in which sex they equal one-fifth total length of mite—being somewhat more attenuated though not longer than are those of the opposite one. The movable jaw of these chelæ, or pincers, has three triangular lateral teeth and one terminal one, and of the former the central one is the smallest. The body, that is twice as long as broad, and rounded behind, bears

—as in the species mentioned—a number of long bristles that are themselves ciliated. These each arise from rounded tubercular swellings, and are capable of being independently moved. They correspond in position to those of *T. siro*, as described by Canestrini and others. Those extending from the hind border may equal half the total length of the insect. In addition to the four dorsal and eight marginal ones near the posterior contour of the abdomen—as seen from above—there are two central ones shorter than the others. The two that extend forwards from the front of the cephalothorax reach the extremity of the mandibles, and the four that are placed in a backwardly curved transverse line in front of the second pair of legs are of unequal length, the two central ones extending forwards to the tip of the rostrum or even beyond it. In the male the tarsal joint of the fourth pair of legs has two small cushion-like projections on its outer surface at about one-third and two-thirds of its length, between which this is concave. In addition, there exist the usual sexual distinctions. The legs of the first and second pairs are of equal length, and those of the fourth pair are the longest; their relative length in the male being expressed by the numbers 37, 37, 39, 43. The following tabulation, showing the length of the tarsi and of the third and fourth joints of the first and fourth pairs of legs, will serve to readily distinguish this *Tyroglyphus* from either *T. siro* or *T. longior*:—

		Male.		Female.	
		(a)	(b)		
Length of tarsus	1st pair ...	14	15	...	25
„ joints 3 and 4	„ ..	11	13	...	25
„ tarsus	4th pair ...	15	17	...	35
„ joints 3 and 4	„ ...	13	13	...	30

The female closely resembles the male, but is of larger size.

The male has a length of $230\ \mu$ to $287\ \mu$, and a breadth of $115\ \mu$ to $137\ \mu$; the female a length of $562\ \mu$ and a breadth of $275\ \mu$.

4. A large mite that is abundantly distinct from any of the foregoing, that belongs to the family Gamasidæ. This evidently feeds on its associates. Unfortunately, it is of uncommon occurrence in the fruitlets.

REMEDIES.

As the Tarsonemus Mites occur throughout the entire pineapple plant, and as when once connected with it the association between the two is perennial, plants that it may be inferred from the condition of their fruit are infested, should be gradually rooted out and burnt, otherwise they may become more and more “diseased.” In replacing these, or indeed in starting a new plot or establishing a plantation, suckers derived exclusively from plants in which this malady has not previously been remarked should be employed. As an additional precaution also they should be steeped in a lime-and-sulphur wash for some hours prior to being placed in the soil, or treated with a carbolic-acid wash—such as may be made with Little’s soluble Phenyl—in the same manner.

The lime-and-sulphur wash may be prepared as follows:—Boil water in a copper; take of good lime and powdered sulphur equal weights; pound the former; mix the two in a little water to the consistency of a cream; then pour this cream-like mixture into the water, whilst this is being maintained in a constant state of ebullition; continue boiling till the lime and sulphur amalgamate and an orange-coloured solution is produced. In making this the exact amount of boiling water is a matter of indifference, but this should not exceed ten gallons.

The degree of subsequent dilution (with warm water) to be made, will, however, depend of course on the amount of water used in the first instance, but the maximum of strength that the plant will tolerate should be employed, since mites do not readily succumb to the action of insecticides. Experiments to test this have, however, yet to be made. So also with regard to the carbolic-acid wash. Possibly, as has been suggested to the writer, on his conclusions as to the nature and origin of the disease being made known, some benefit may also be derived from dusting affected plants with sulphur.

DESCRIPTION OF PLATES.

PLATE LXVIII.—(From Photographs by F. C. Wills.)

A—Transverse section of Prickly Queen Pineapple, showing Fruitlet Core-rot Disease.

B—Transverse section of Smooth-leaf Pineapple, showing analogous disease.

PLATE LXIX.—(From Photograph by F. C. Wills.)

Smooth-leaf Pineapple, exhibiting external symptoms of same (Plate LXVIII., B).

NOTE.—This fails to adequately represent the distinctly-defined limits of the disease areas that obtain.

PLATE LXX.—(From Drawings by F. C. Wills.)

A—1-4. Fruitlets of Prickly Queen Pineapple, in longitudinal section. 1. Healthy. 2-4. Successive stages of disease.

a, Upper or outer chamber; b, Depressions at base of style where disease (d) commences; c, Seed cavities or locules of ovary; e, Placental column of ditto; d, Tissue involved by disease. Three-fourths natural size.

B—Fruitlets of Smooth-leaf Pineapple, in longitudinal section, showing two different stages of disease (d). Three-fourths natural size.

C—Fungus (?) *Monilia* sp., associated with disease in Prickly Queen Pineapple.

a, Mycelium, sporophore or spore-bearer; c, Spores; d, Septate spores; e, Sprouting spores. Magnification, 377 times linear. (After Drawing by Writer.)

PLATE LXXI.—(By F. C. Wills; after Drawings by Writer.)

FIG. 1. *Tarsonemus ananas*, sp. nov., or Pineapple Tarsonemus Mite, female; lower surface. Magnification, 338 times linear.

„ 2. *Tarsonemus* Mite, male; lower surface. Magnification, 338 times linear.

„ 3. Fungus-eating Mite (*Tyroglyphidæ*); upper surface. Magnification, 72 times linear.

„ 4. „ „ „ lower surface. Magnification, 72 times linear.

„ 5. *Tyroglyphus ananas*, sp. nov., male; lower surface. Magnification, 211 times linear.

„ 6. „ „ „ chilate mandibles, as seen when magnified.

Forestry.

WATTLE CULTIVATION.

A NEGLECTED QUEENSLAND INDUSTRY.

THERE are many portions of the mountainous parts of Queensland of which it is often remarked that the land is apparently fit for nothing—that it will not feed the proverbial goat; that the undergrowth of young gums and wattles will not even allow a dog's bark to travel. From a purely agricultural point of view, such country is undoubtedly useless as farming land; but there are few “bad lands” in the colony, provided they do not consist of sandy, swampy “wallum” country, on which something of value will not grow. Take the gravelly ridges so frequently met with on the coast. They are unsuitable for maize, which will produce on good lands from £6 to £8 per acre, but they are the ideal home of the Sisal hemp, and of the Mauritius hemp, which will produce £40 per acre. In like manner, the ridges and gullies of the Main Range are a favourite habitat of the wattle-tree, which will yield from £25 to £30 per acre. During the winter season, the eye of the traveller amongst the ranges is delighted with the beautiful, feathery, yellow bloom of countless wattle-trees of different varieties.

Three varieties have been planted for the purpose of obtaining tan bark, but of these only two are of commercial value. The third was an unfortunate introduction, and in New Zealand formed a large part of the earlier-laid-out plantations. It is comparatively worthless. This is the *Acacia dealbata*.

The second best is the Golden Wattle (*Acacia pycnantha*), the bark of which yields a large per cent. of tannin. But this does not form a large-sized tree, and from its habit of growth, throwing out many stems, more like an immense bush than a tree, it is more troublesome, and consequently more expensive to strip than the Black Wattle (*Acacia decurrens*), which grows to a respectable size and forms a good straight barrel. Wattle-bark is extensively exported from Tasmania and New Zealand. The price has fallen to £5 15s. per ton, whilst formerly the bark in bundles fetched £12 per ton. But it will pay at the lower price, once a plantation is established. It takes about nine years before a full return can be obtained.

The wattle, whilst doing well on poor soils, has no objection to a richer one, provided it be well drained. Hence on the naturally drained slopes and valleys of the ranges, plantations may be formed with almost a certainty of success. Bush fires will naturally do much damage, but the effects of these may be minimised by judiciously planting—leaving breaks between the blocks.

Inspector Clifton, of Auckland, New Zealand, describes the wattle plantations at Wairangi. He says the usual procedure in forming a wattle plantation is to fell and clear the scrub, plough, and work down roughly with disc harrows, and sow during the month of October.* Scald the seed, and sow at the rate of 1 lb. per acre. A great advance on this is to drill in $\frac{3}{4}$ -lb. of seed with 1 cwt. of bonedust. Trees so treated are, at two years, equal to those of four years' growth sown without manure.

The cost of wattle-planting may be estimated as follows:—

	£	s.	d.
Clearing and burning, per acre ...	0	7	6
Ploughing	0	7	6
Disc harrowing, one stroke ...	0	1	3
Sowing	0	0	9
Seed, 1 lb.	0	2	0
Harrowing	0	1	0
Total	£1	0	0

To this, with advantage, may be added—

	s.	d.
Second ploughing, at 6s. per acre ...	6	0
Bones, $1\frac{1}{2}$ cwt., at £5 10s. per ton ...	8	3
Total	14	3

The returns may be estimated at—

	£	s.	d.	£	s.	d.
Per acre—10 tons of green bark=5 tons dry, at £5 15s. per ton				28	15	0
Expenses—						
Shipping 10 tons, at £1 per ton ...	10	0	0			
Weighing, carting, and storing 10 tons, at 2s. 6d.	1	5	0			
Railage, about 5s. on 5 tons	1	5	0			
				12	10	0
				£16	5	0

From this has to be deducted rent, interest, &c.

* The scrub here alluded to is not the dense vine scrub with which we are familiar in Queensland.—Ed. Q.A.J.

Wattle-growing in New Zealand for the production of tanning bark occupies an area of about 4,500 acres in the Auckland district. The Black Wattle (*Acacia decurrens*) is the only variety planted.

Wattle plantations do not increase greatly, mainly owing to the length of time which elapses before a full return can be obtained. There are, however, many settlers in Queensland, who have from 5 to 500 acres of poor open land, where scarcely any clearing is needed, and on which they might in spare moments put in a few hundred trees which would come in to benefit some members of the family. We know of farmers who have occupied their land now for nearly forty years, and the portion of hungry, waste, untouched land lies hungry and waste to this day. Had this been planted ever so roughly with wattle-trees of the right kind, they would have been enjoying an income of at least £10 per acre for thirty years, and at the old prices that income would have reached £30 per acre.

At Lucindale (S.A.), Mr. Newman recently read a paper on Wattle Cultivation before that branch of the Bureau of Agriculture. He said he had great confidence that this could be made one of the most profitable industries of this district, as the soil, climate, and the facilities for delivering the bark at a seaport are all that can be desired. He saw part of a plantation east of Adelaide stripped; the yield being 4 tons per acre, and enough small wattles being left to make another good yield in two or three years' time. The price obtained for the bark was £5 5s. per ton in the field; the price paid for stripping was £1 5s. per ton, which included cutting the trees down and packing them in heaps; the landowner receiving £4 per ton clear, equal to £16 per acre. The land was of poor quality, being very stony and sandy. During the past ten years he had experimented in wattle-growing in this district, and proved that they can be grown on almost any land that is over 3 feet above the level of the winter flood waters. A few months ago he stripped a wattle seven years old that gave over 1 cwt. of bark fit for market. Trees of that size standing 20 feet apart each way would give over 5 tons per acre. That tree was grown on a limestone ridge (red soil), and he had them of nearly equal growth on the fern hills (white sand). As there are thousands of acres of open fern land in that district almost useless for grazing, and eminently suited for wattle-growing, he would strongly urge leaseholders to give that industry a trial. Such land is leased at from $\frac{1}{2}$ d. to 2d. an acre annually. About four years ago he planted 1 acre of fern land, and now estimates the wattles on it to be worth £8 to £10. Although the wattle has never been systematically cultivated at Mount Benson, in the Kingston district, still it grows there over a considerable area, and last season no less than 1,200 tons of bark were stripped and sent to market, the price received ranging from £3 15s. to £4 per ton; and as stripping costs £1 per ton, it means £1,200 being distributed amongst the labouring classes of the district, and about £3,500 amongst the landholders and teamsters. The bark grown at Mount Benson is deficient in tannic acid, consequently a lower price has to be taken. Where only a small area is to be planted, he found the following a good plan:—Commence at one side of the field, using a double-furrow plough, strike out the length of the piece to be planted, then mark out back again parallel with the first furrows and about 8 feet away from them, and so on through the field. Then take 1 lb. of good seed for each acre, place in a vessel and cover with boiling water, and allow them to soak for twenty-four hours, then drop them regularly along the ploughed strips and cover with a harrow. The next year it will be necessary to thin out the plants in the rows to the required distance. Where large areas are to be cultivated it would save time and labour to have a box fitted to the back of the plough with a roller through it, and worked by a belt with the near wheel, and so made to drop a seed or two at each revolution, and a small harrow attached would complete the planting in one operation. One team should do 8 acres a day. About every 5 chains it is advisable to leave a strip 16 feet wide unplanted for the purpose of drawing furrows in summer to check a possible fire, and later on as a roadway for carting out the bark. He could not recommend

broadcast sowing, as there is so much more labour in ploughing all the land, and the work of thinning out the young plants is very much greater. He would strongly advise that only seed of the true broad-leaf wattle should be planted, as it is doubtful whether it will pay to grow any other variety, the bark of which will be worth quite 20 per cent. less. Horses may be allowed the free run of a wattle paddock, but cattle should be kept out altogether, and sheep should not be allowed in until the tops of the plants are out of reach, as they are very fond of the young shoots. He felt certain that if the bark had no market value it would pay well to plough fern hills, and sow 3 or 4 lb. of seed per acre broadcast, and keep all stock out for three years, by which time the wattles would provide a very large amount of feed for either cattle or sheep.

DOBBIE'S WATTLE-BARKING MACHINE.

This lately invented machine readily strips the trees close up to the leaves far higher than could be stripped by hand. The speedy operation of the machine shows to special advantage on wattles from the thickness of walking-sticks up to 3 inches in diameter, indicating that where the crops of wattles were so abundant as to require thinning out, and were too small to strip by hand, it would pay to use the machine. It has been regarded as being quite evident that the machine would reduce the cost of stripping by at least 25 per cent. Moreover, by using the implement, stripping could be commenced much earlier and carried on much later in the season than is possible by hand. The machine itself has the appearance of a substantial roller mangle, the rollers being either metal or covered with metal. One man can carry out the whole of the operations; but it would apparently be still greater economy for two or even four men or boys to operate in conjunction with one another. In using the machine the wattles pass between the revolving rollers, thus receiving pressure upon two sides, which cuts top and bottom, and causes the bark to spring from the complete circle of the stem in two halves. It would appear from this that a very valuable addition has been made to the wattle-bark industry.

General Notes.

GREATER BRITAIN EXHIBITION.

THE Department of Agriculture is bestirring itself in earnest to present Queensland and its industries in their true light before the British public at the forthcoming Exhibition at Earls Court. Not only will multitudinous samples of our products find a place in the Queensland annexe, but the different phases of colonial life, as represented by the industries of sugar-planting, general farming, sheep and cattle raising, mining, timber-getting, pearl-shelling, &c., &c., will be presented to the eye of our kinsmen "at home" by a number of splendid enlarged photographs. In addition to these, about a hundred lantern slides on the same subjects have been prepared, with a lecturette to accompany each picture. Mr. F. C. Wills, artist to the Department, to whom fell the arduous work of preparing all these pictures and slides, has been most successful in carrying out his instructions, and the result of his labours cannot fail to impress the people of Great Britain with the fact that a Greater Britain has grown up around the mother country, from the Poles to the Equator, all joining hands and firmly united either for peaceful trade or horrid war.

The Minister for Agriculture has now instructed Mr. Wills to proceed to Sydney and Melbourne, to make arrangements for a series of views of moving life, which will be exhibited by the aid of the cinematographe. These cannot fail to prove of great value to any lecturer on Queensland.

One of the lantern slides is the Queensland coat-of-arms, made entirely of various-coloured maize. It will be remembered that this coat-of-arms was shown in the agricultural section, at the last Exhibition. In this connection,

the Department would be glad to receive samples of red, white, black, and yellow maize, both in the cob and shelled, to be applied to a similar purpose at Earls court. Any persons who have such maize in their possession would greatly oblige the Department by forwarding what they can spare as early as possible, as there is not too much time now in which to complete the work of preparation.

THE PRICE OF WHEAT.

Now that the farmers have got some of their wheat threshed, the important question will arise: "What price will wheat be this season?" This can at present be only a matter for conjecture, for it depends principally on the quantity which will be available for export. If it should turn out that the yield, at all events in the Southern Colonies, is equal to if not greater than that of last year, which it may be, notwithstanding the numerous failures, then an outside market must be found; and once we go beyond Australasia for our customers, we are faced with the fact that we no longer fix our own prices—they are ruled by those of the great antipodean wheat-producing countries. Amongst wheat-producers, Australasia counts for very little. To the 2,210,800,000 bushels produced by Europe, Asia, America, and Africa, Australasia added but 26,800,000 bushels; thus the whole of the seven colonies only produced 1·2 per cent. of the whole crop. The exporting colonies are Victoria, South Australia, New Zealand, and probably now New South Wales. Their wheats must compete with those of Russia, France, America, &c. The Russian crop has been a bad one. France will probably barely grow sufficient for her own requirements. The North American crop is well reported on, as are also the crops in South America.

Wheat at present is worth in Sydney 3s. 4d. to 3s. 5d. for good full grain; 3s. 3d. for good average quality, and 3s. for off grades. In Melbourne the price ranges from 3s. 2½d. to 3s. 3d. per bushel. The question of holding or of at once selling is a matter for the farmer to decide, but it must not be forgotten that our millers will buy in the cheapest market, and will not hold themselves patriotically bound to take Queensland wheat unless the grain and the price are to their liking.

KANGAROO TAILS.

Just twelve months ago there arrived for the first time in England a consignment of kangaroo tails. They were consigned to a salesman of Leadenhall Market, and as soon as they reached his hands he found ready customers for them. The consignment consisted of some 500 tails, packed in boxes of fifty each. The public discovered that the tail of a kangaroo made into soup was a very succulent dish, rich and highly nutritious, and, like *Oliver Twist*, they asked for more, but the stock of 500 caudal appendages was soon exhausted. The tail of the kangaroo is not an expensive luxury, as it is sold at the rate of about 1s. per lb. The supply is, of course, a restricted one, as the kangaroo inhabits the bush, and cold-air stores are a considerable distance from the country districts. Consequently, kangaroo-tail soup will never be a familiar item on a city menu.—*City Press*.

THE HOP CROPS OF THE WORLD.

THE following is Messrs. W. H. and H. Le May's annual report on the hop crops of the world:—We have again the pleasure to address to you our annual circular on the hop crop of the world, the first pickings of which are just coming to market.

We have made (if possible, more than usual) a most exhaustive examination of the hop grounds of England, and from the personal knowledge thus gained, and the information we have received from our foreign correspondents, we believe we are in a position to give an accurate forecast of the crop as compared with that of last year.

Never before, even in the memory of the oldest hop-grower, has there been such a persistent and prolonged attack of aphid blight in the hop gardens of England, which commenced early in May, and was only finally conquered

about last August, when the hot weather set in to help the efforts of the washing machine, which up to that time had proved ineffectual to get rid of it, although many farmers had washed their hops seven to ten times, and we are sure there has never been a crop of hops raised at so great an expense to the farmer as has been the case this year. The cold weather of June and July seriously retarded the growth in many gardens of the Golding Bine in Mid and East Kent.

Taking the English growth in the aggregate, and putting a liberal estimate, we believe that it will fall short of that of last year by 20 per cent. The acreage being again decreased by 1,128 acres will, of course, accentuate the position, and puts the shortage beyond question.

With an ever-increasing consumption of beer, the last annual return being 35,632,131 barrels, which will, with the hops now used in non-alcoholic drinks and yeast, bring the annual requirement up to 800,000 cwt., it does not want much foresight to see that before the 1899 crop can be picked, there will be the greatest shortage of hops the world has ever seen, for, although America will produce as many hops as last year, the Continent will fall short, especially in the hops which are usually exported to England—viz., Altmarks (North German hops) will only grow one-fifth of last year; Alost, one-fourth; Poperinghe, one-third; Alsace and Lorraine nearly half, and Burgundy a little over half; Bavaria and Austria will produce about four-fifths; consequently consumers must not expect to be helped over their difficulty by hops from the Continent.

With regard to the prices likely to be realised for the English crop, it is our opinion we shall have no difficulty in making £7 to £8 per cwt. for the choice Golding hops grown in Mid and East Kent respectively, and that all good sound hops suitable for copper use, such as the Fuggle, will sell freely at £5 to £6 6s. per cwt., and it will depend upon these prices being realised or not whether there will be another serious grubbing of the hops again this season.

We are confident there will be a strong demand for the new crop as soon as it is fairly on the market; we advise growers to be most careful in picking and drying, and under no circumstances to be tempted to pick badly diseased hops.

HEN AND CHICKENS IN JELLY.

ONE quart of milk, two ounces of isinglass, a stick of chocolate, a few petals of saffron, sugar to taste, the rind of two oranges, a gill of calf's-foot jelly. Make a quart of blanc-mange with a quart of milk and two ounces of isinglass, flavour it with sweet almonds (essence), colour a little of the blanc-mange brown with chocolate, put it into a mould the shape of a hen, colour another portion with a little saffron, leaving the remainder white. Fill three small moulds to resemble chickens with white, three with yellow, and two with brown, to match the hen. When the moulds are quite cold, turn the chickens and hen out on to a dish that has been slightly covered with calf's-foot jelly, so that the chickens will stand upright. Boil some orange-peel until quite tender, and cut very thin to resemble straws. Scatter this round the birds, then pour some jelly over the straw. This makes a pretty dish for a child's birthday party. The moulds should be lightly brushed over with oil before pouring in the blanc-mange.

THE ORIGIN OF BEET SUGAR.

THE production of sugar from beetroot was first brought into public notice by a Berlin chemist, in the year 1747, but little or no attention was given to the discovery till 1790. The first beet-sugar manufactory was erected in Silesia. In France the industry was afterwards taken up seriously, Napoleon I. being personally interested. Later, in 1800, a factory was established in the province of Tula, Russia; and the demand was increased so considerably during this century that there were 754,758 tons produced last year by 238 factories.

TAKING OFF HIDES.

A HIDE may be so injured in removing it from the animal that enough will not be realised for it to pay for the time occupied in doing the work. The "National Provisioner," speaking of removing the skins from cattle and calves, gives the following hints, which it will pay any farmer or stock-raiser to make note of, for, even though one may not kill any animals for eating purposes, no one is so fortunate as never to lose one by accident or disease. In skinning beef hides and calf skins, keep the back of the knife close to the hide, and draw it tightly with the left hand. This is a simple rule, but, by following it, the liability to cut or score is considerably lessened. On the foreleg the knife should go down to the armpit, so called, and then forward to the point of the brisket. On the hind leg, the cut should be made from the hoof of one down to the back of the leg semicircularly across one to the other, and on to the hoof. The throat should never be cut cross-wise, and the horns and tail bones should always be removed. The operation of salting is equally important. To salt hides thoroughly, a waterbucket full of good salt should be used to each 60-lb. hide, the quantity for large and small hides being in proportion. After this they should be rubbed and rolled up. Independent of cuts and scores, hides which are not taken off in the manner specified are classed as Nos. 2, and if dried on fences or exposed to the sun or weather are only fit for the glue-maker. A butcher's skinning knife should always be used, and no employee should be permitted to take off hides without one, as the loss from one hole in a hide would buy several such knives. These few rules are simple enough, but their adoption means a great deal to the country slaughterer.

ARTIFICIAL BEE-FEEDER.

THOSE who have gone in for bee-keeping will realise the necessity for some artificial means of succouring the insects in the early spring after a spell of warm weather has induced them to quit their winter quarters. After stocks have been divided in the autumn, and a sufficient quantity of queens have been distributed, the bees, under ordinary conditions, will be well until the following spring. It is at the period preceding summer that the stock breed rapidly, and then pollen is required. Failing pollen from fruit trees and flowering plants, a substitute must be given, placed so that the insects can get at it readily. A good artificial food is provided by dipping a bundle of hemp or tow into peatflour. This should be suspended under a glass bell, supported by



a tripod about two feet from the ground, the peafLOUR bunch being removed beyond the reach of the rain. Here the bees will shelter in inclement weather, and even when the sun is bright they will load themselves with peafLOUR pollen. This artificial food is stimulating, and the bees thrive well on it.

TO FIND THE NUMBER OF GALLONS RAISED BY A PUMP.

FIRST find the diameter of the pump cylinder and then the length of stroke.

Square the diameter of the cylinder, multiply this by the length of the stroke, and divide by 353. The result will be the number of gallons of water raised at each stroke of the piston-rod.

Of course, the number of strokes per hour must be known, and also the question of resistance, owing to the height to which the water has to be lifted, must be considered in getting at the hourly work of the pump.

EXAMPLE.

Diameter of cylinder, 3 inches

Length of stroke, 12 inches

$$3 \times 3 = 9$$

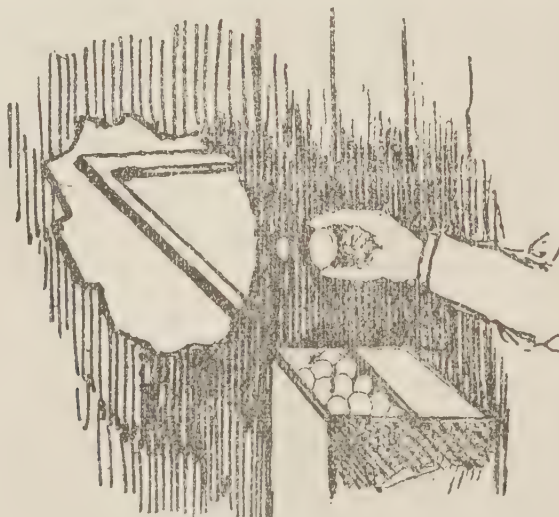
$$9 \times 12 = 108$$

$$108 \div 353 = \cdot 3005, \text{ or about } \frac{1}{3} \text{ gallon per stroke.}$$

The amount of water raised by a single-action pump in twenty-four hours would then be equal to the quantity raised per stroke multiplied by the number of strokes per hour into the twenty-four hours, supposing the pump working night and day.

EGG-TESTER.

WE illustrate an egg-tester which cannot be surpassed for determining the fertility of eggs after setting, and also for ascertaining whether the chick is alive in its different stages from two or three days up to the time of hatching. By throwing out all the infertile eggs and dead chicks, whether in incubators or under hens, a great saving of time is effected when the hatching season is at its height. By its use breeders can also determine in a few days whether the eggs they are sending out to customers are generally fertile or not, and in this



way making a saving to themselves and their customers of time, patience, and money. The tester is made by cutting a hole in the north side of a building or a large dry-goods box, and having a mirror outside in such a position as to reflect the sun's rays directly into the hole, and upon the eggs, held against it from the inside. The inside, of course, should be as dark as possible. Our illustration is so clear that further description is not necessary. This method of testing eggs has been used for a number of years, and has been found convenient and practical.—*Weekly Times*.

THE TUBERCULIN TEST—A PLEA FOR NON-SLAUGHTER.

ONE of the most controversial subjects in relation to the cattle industry is the utilisation of the tuberculin test. Its application will in many respects seriously affect the interest of our cattle breeders and exporters. These being admitted facts, any fresh light that can be given upon this question, especially if it proceeds from reliable sources, will not only be welcome but greatly appreciated. Until last year, the regulations in respect to the exportation of cattle to Canada required that, before admission to enter that country could be obtained, it was necessary that the animal should be able to pass satisfactorily, after its arrival at the quarantine station, the tuberculin test. The *modus operandi* in actual practice proved so detrimental to the industry it was designed to protect that a modified form of regulations was issued by the Canadian Government, whereby it was agreed that animals successfully tested here should be admitted without further test on arrival. The Argentine Government have recently adopted the same sort of regulations, as we understand them, as were originally in operation in respect to Canada, but found unworkable by that Government, so that no excuse is needed to bring before our readers the fullest possible information bearing upon this subject.

The United States was, perhaps, the one country of all others where the extremists in respect to the tuberculin test carried their powers to the greatest extent. It was in this country that indiscriminate slaughter took place without either rhyme or reason, and it is therefore with satisfaction that one is able to gather from recent communications from that country that saner methods are likely to prevail in future.

DETAILS OF AN EXPERIMENT.

The New Hampshire Cattle Commissioners have conducted a most careful test with ten animals, and the conclusions arrived at are most significant, as well as of great value—not that they prove the unreliability of the test, but because they prove that the evil arising from the existence of the disease in the bovine race is greatly exaggerated.

The following is a brief record of this test:—

The ten cows were all tested in June, 1897, and all reacted.

On 12th September, 1897, only five of them reacted, one of which was killed, and the condition of the disease is reported to have been as follows:—
“So infinitesimal as to require no consideration upon any health basis, and was strong proof of the extravagance in destroying animals by the test alone.”

Again, on 1st December, only three reacted, one of which had shown manifest physical signs of the disease; and the same result was obtained in February last. The two which showed no sign of the trouble, but which had reacted, were killed and examined, and the commissioners found—so says the report—“Slight evidence of disease, but in such condition as to lead to the conclusion that it had not only been arrested but was on the way to ultimate recovery.” How much this result was due to the treatment of the animals, and how much to the alleged curative qualities of the tuberculin, is a matter of conjecture only. There are no developments of science in regard to the nature and characteristics of bovine tuberculosis that warrant the destruction of such animals.

The five cows which reacted at the first trial were discharged from the quarantine as “healthy and vigorous,” and then the authority from which we quote (the *Breeders' Gazette*) adds the following significant words:—

“Like sensible men, who were hunting for the truth, and not searching for facts to sustain fine-spun theories, the commissioners land a few body blows in the ‘kill-everything’ crowd as follows:—

“The policy outlined at the outset, and resolutely followed, has been sustained by the result of this experiment, and is being adopted in the States around us, where a more radical policy has prevailed. In Massachusetts,

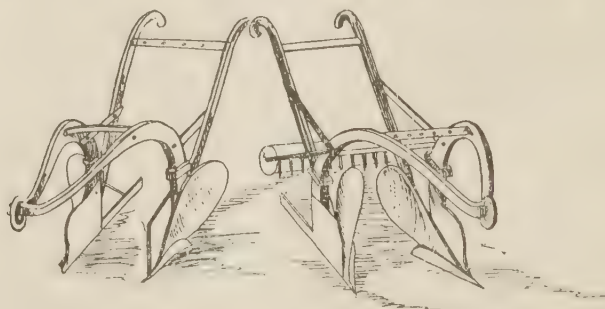
where more than 750,000 dollars have been spent during the past four years, and where every animal reacting to the tuberculin test was destroyed, the whole matter has been abandoned. In Connecticut, where the same extravagant policy prevailed, the authorities are now working the same line as in New Hampshire. This means the destroying of the tuberculous animals detected by a physical examination, and the advocacy of sanitary measures for the prevention of disease. We have faith in tuberculin as a diagnostic agent, and depend upon it for certain purposes, but not as authority for destroying animals."

I think every moderate man will heartily commend the views set forth in the above quotation, and I am fully at one with the conclusions arrived at, which are in reality but two:

- (1) The slaughter of all animals that are diseased, so that the same can be definitely determined by physical examination.
 - (2) That proper sanitary arrangements shall be made and effectually carried out in respect to the control and management of cowsheds in towns, &c., which I believe have, in the main, been the most prolific sources from which this disease has so largely spread abroad not only in this country but elsewhere. And thus, for the present, at any rate, let the test remain for use as a diagnostic agent, and not one which shall have power to sign the death-warrants of cattle whose product represents not merely the labour of years but of a lifetime or longer. It is, of course, open that future discoveries and increased knowledge and experience may bring to light new facts in relation to this test, but until that time arrives I am content to adopt the opinions expressed by reasonable American authorities.
- Farmer and Stockbreeder.*

A NEW PLOUGH.

THE plough which we illustrate herewith is so constructed as to throw the furrows simultaneously from both sides to a common centre or line in covering, or in the cultivation of plants. The plough may be also adjusted to throw the soil from a common centre or line to opposite sides of the plants under cultivation. Our illustrations represent the plough in both adjustments. It is constructed with two beams joined at their fore ends, and diverging as they extend rearwards. These beams are adjustably connected near the rear ends by sliding bars. The mouldboards are somewhat longer than in ordinary ploughs, and are designed to throw the earth further than usual. The landsides are also longer than in the ploughs now in use, rendering this plough steadier



and easier to run. The handles are capable of being removably connected, either with brackets attached to the mouldboards or with arms attached to the shanks. When the plough is adjusted to throw the earth inward, a roller and rake are attached to the beams, so that the furrows thrown up may be cultivated by the rake and flattened by the roller. When it is desired to throw the earth outward, the ploughs are interchanged; that is, the one which was on the right side is now attached to the left side, the other being also changed so that its landside shall be turned inward. The roller and rake, when the plough is in this position, are removed, since they are not required. The improvements have been patented by Jesse W. Ross, of New Orleans.—*Leader.*

MANURES.

IN reply to inquiry made by the Gumeracha Branch of the South Australian Bureau of Agriculture, Professor Lowrie wrote to the following effect:—

There can be little satisfaction in adhering to any definite formula in the use of manures; soils vary so much and are impoverished so variously according to the character of the cropping to which they have been submitted that the farmer must exercise his own judgment and read his fields carefully, to be guided both in regard to kinds and quantities of manure to apply.

Wheat.—(a.) Phosphatic manure alone, about 2 cwt. per acre. The chief phosphatic manures are bonedust, superphosphates (bone or mineral), basic slag, and phosphatic guano. (b.) For land deficient in nitrogen: (1) $1\frac{1}{2}$ cwt. to $1\frac{3}{4}$ cwt. super., and $\frac{1}{2}$ cwt. to 1 cwt. sulphate of ammonia; (2) 2 cwt. basic slag and $\frac{1}{2}$ cwt. to $\frac{3}{4}$ cwt. nitrate of soda; (3) $1\frac{1}{2}$ cwt. to 2 cwt. bonedust, and $\frac{1}{2}$ cwt. to $\frac{3}{4}$ cwt. nitrate of soda or sulphate of ammonia. Sour land may require quicklime, also light sand; apply this in dressings of 2 tons or thereabouts per acre. Occasionally light lands may also require potash, and the mixture might be some such as $1\frac{1}{2}$ cwt. super. or bonedust, $\frac{1}{2}$ cwt. to $\frac{3}{4}$ cwt. sulphate of ammonia, and 3 cwt. wood ashes or $1\frac{1}{2}$ cwt. kainit. Lighter or heavier dressings may be made according to condition of the land.

Potatoes.—(a) Wood ashes in abundance or kainit or sulphate of potash. Muriate of potash is said to cause waxy potatoes; (b) 4 cwt. to 5 cwt. wood ashes and 3 cwt. to 4 cwt. or more of super. or bonedust per acre (see note *re* mixing ashes and super.); (c) 4 cwt. to 5 cwt. wood ashes with 3 cwt. bonedust and 1 cwt. of nitrate of soda—this is a substantial dressing for colonial practice, but light compared with practice in older countries; (d) farmyard manure, and plenty of it, invariably enhances the yield greatly, but is said to make potatoes scabby.

Lucerne.—Bonedust in abundance—4 cwt. up to 10 cwt. according to crop yielded—applied annually at the time the lucerne is cultivated in the winter. Gypsum also is useful, as is quicklime in good heavy dressings occasionally, not in hundredweights but in tons; 2 tons is generally little enough.

Swedes.—Superphosphate in abundance.

Mangolds.—Nitrogenous salts especially. A good dressing is: Farmyard manure, 8 tons to 10 tons per acre; $1\frac{1}{2}$ cwt. bonedust or super.; and 1 cwt. sulphate of ammonia or nitrate of soda, together with 2 cwt. to 3 cwt. common salt.

Incompatibles (i.e., Should not be mixed).—(a) Nitrate of soda and super.; (b) super. and quicklime; (c) basic slag and sulphate of ammonia; (d) lime and sulphate of ammonia; (e) wood ashes and super. should not be mixed long before application, and are better applied separately.

PHYLLOXERA DEFEATED.

It has been reported to the Academy of Science, at Paris, by M. Dubois, that he has succeeded in discovering a micro-organism which kills phylloxera and kindred pests. The bodies of the insects so killed contained when inspected a great many bacteria; but the poisonous qualities of the organisms seem to differ according to the nature of the soil and the weather. Dubois placed two roots of vines containing phylloxera upon blotting-paper, and sowed bacteria on to them. Eight other roots he put into vessels filled with earth, and sowed bacteria on these also. After two days all the phylloxera were dead on the two roots on the blotting-paper; after five days on the eight roots; while those two roots which had not received any bacteria had plenty of living phylloxera on them. Others could also detect bacteria within the bodies of the dead phylloxera in some instances.

NITROGEN FROM THE AIR.

It is stated that by some new chemical process nitrogen, in the form of sulphate of ammonia, is now obtained artificially from the air. The cost is put at \$20 (£4) per ton, and in addition a by-product is obtained which will have a great effect on gas manufacture. If that be so, then a great boon will have been conferred on agriculturists, but until actual facts are to hand it will be well to suspend judgment.

A NEW VETERINARY OPERATION.

MR. DEANS, M.R.C.V.S. London, stated lately at a meeting of the Lancashire Veterinary Medical Association that he had operated upon hundred of cases of bog spavin, thoroughpin, and similar enlargements of the stifle joint, not only without any bad results but in a manner which enabled a horse to compete in the show ring, no enlargement remaining, nor any blemish which can be detected by experts.

The enlargements are due to a dropsical condition of the capsules, or capsular ligaments which surround the joints and contain the synovia commonly known as joint oil.

From strain or hereditary defect, these capsules secrete too great a quantity of fluid, and that not of the nature and quality demanded.

On this subject, the *Farmer and Stockbreeder* says:—"The opening of a joint has always, and rightly, been regarded as so serious a matter that curative treatment by evacuation of its contents has not, until recently, received the sanction of professors of veterinary surgery."

Mr. Deans has now operated upon a great number, he states, successfully, by employing an aspirator which withdraws the superfluous fluid without the admission of air, and then he proceeds to inject a powerful irritant in the form of perchloride of mercury (corrosive sublimate) and iodine, with spirits of wine.

Professor McCall, himself a Clydesdale breeder, gave his experience of the treatment advocated by his former pupil (Mr. Deans), and tried by him upon three cases. One was entirely successful, the second conferred no benefit whatever, the third for twenty-four hours suffered the most excruciating pain, lay down, got up frequently, breathed hurriedly, and perspired profusely. In a fortnight he could use the limb, and what a blessing, for the other hind limb, from so long carrying the entire weight, had failed him. On the following Saturday he presented a sorry picture of his former self, having lost his middle piece, and unable to do more than crawl along at a snail's pace, with his hind limbs; and worse than all, the stifle joint was larger than ever. He also walked on the point of the toe on the limb operated on, and did not allow the heels of the shoe to touch the ground.

How this case may finally terminate, no one can say, "but," adds the professor, "he is my property, and I shall be pleased to let you know the result."

The old plan of treatment was to apply pressure by means of a truss where applicable (it is not possible at the stifle joint) or by plaster or "charge." In addition to these means it is found that repeated blisters thicken the skin, reduce its elasticity, and so form more or less of a permanent compress or bandage. Many cases in young animals get well without any treatment at all, and by far the greater number recover sufficiently to work sound if a stiff pitch plaster, with a small proportion of Spanish fly in it, is put on warm and allowed to remain until, by the new growth of hair, it eventually falls off. These enlargements are one of the commonest defects of the Clydesdale, whose conformation lends itself to bog spavin, thoroughpin, &c., so many of the breed having straight hind legs. No matter how good a family a horse may belong to, he should not be used for stud if he has this defect, which will almost surely be handed down to his progeny.

HOW TO GROW MELONS.

MELONS will grow after a fashion on most soils. The pie-melon grows in almost pure sand in many parts of the sea-coast of Queensland. But a fairly rich loamy soil resting on a stiff subsoil is about the best suited to its nature. A soil that bakes on the surface and retains much moisture is unsuitable. Very fine melons, both of the rock, water, sugar, and champagne varieties are grown in quantities on our light scrub soils.

As the vines begin to run, it will be noticed that they do so with greater rapidity, and the runners look most healthy and succulent, when they make their way over some particularly rich patch or over a manure heap. The reason for this is, that the rootlets emanating from the vines find their way into the rich humus and extract nourishment which is thus conveyed direct to the young vine. It is the same with pumpkins and cucumbers. Hence when preparing for melon-sowing it is always well to spread a light coating of farm-yard manure over the soil the vines will probably cover. When sowing, the seed should not be covered more than an inch beneath the surface. In dry weather plentiful watering should be given to the vines, but no stagnant water must lie about the roots, or the plants will not thrive. Melons of enormous size may be seen in cartloads in Queensland towns during the season. It does not follow, however, that the largest melons are the best; indeed, they are often very watery and insipid.

The great charm of the water-melon is the crispness of the interior mass, and the denser this is and the thinner the inner covering between the rind and it, the better the melon. This crispness and sweetness are more often found in the smaller varieties than in those of abnormal growth.

To secure rich and high flavour the fruit should be kept free from moisture by rain or any other water from the time it begins to shape for ripening. As the lateral branches show fruit they should be stopped back, and the secondary laterals should also be pinched back to the fruit.

In the March number (1898) of the *Journal* we gave directions for growing large melons which are worth attention.

There are several ways of telling when a melon is ripe. One is by the barbarous and ruinous method adopted by some ignoramuses of cutting out a small square piece as in trying a cheese with a cheese-taster. This, of course, destroys the fruit very shortly. Another is by squeezing the melon, and if a slight cracking sound is heard it is probably ripe. This plan is, however, somewhat injurious if the fruit has to be kept for any length of time.

The better way is to notice the colour of the surface resting on the ground. If this is of a rough yellowish colour the melon is ripe. The test applied to the pumpkin of pressing the finger-nail into the lower yellow side is also a guide.

The most infallible test is this: Tap the melon with the knuckles, and if a hollow, drum-like sound is heard the melon is certain to be ripe. To gain experience in this method, it only needs that an unripe melon and one known to be ripe be sounded, and the difference will be at once perceived.

Cobb's Gem, Cuban Queen, and Dixie are good varieties of the water-melon. Skillman's Netted, Large Persian, and Large Nutmeg are amongst the best of the rock or musk melons.

AGRICULTURAL AND HORTICULTURAL SHOWS.

THE Editor will be glad if the secretaries of Agricultural and other Societies will, as early as possible after the fixture of their respective shows, notify him of the date, and also of any change in date which may have been decided on.

LIST OF AGRICULTURAL, HORTICULTURAL, AND PASTORAL SOCIETIES AND ASSOCIATIONS IN QUEENSLAND.

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Allora ...	Central Downs Agricultural and Horticultural Association	J. H. Buxton... ..	1 Feb. 1899
Beaudesert ...	Logan and Albert Pastoral and Agricultural Society	M. Hinchcliffe	6 May
Beenleigh ...	Agricultural and Pastoral Society of Southern Queensland	Wilson Holliday	30 Sept.
Birthingbamba ...	South Kolan Agricultural and General Progress Association	G. W. Nixon	
Blackall ...	Barcoo Pastoral Society	F. Clewett	
Boonah ...	Fassifern and Dugandan Agricultural and Pastoral Association	J. A. McBean	28 April
Booyal Scrub	Booyal Progress Association	H. Masson	
Bowen ...	Pastoral, Agricultural, and Mining Society ...	J. E. Smith	8 June
Bowen ...	Preston Farmers' Association	R. A. Foulger	
Bowen ...	Proserpine Farmers' and Settlers' Association	G. W. Pott	
Brisbane ...	Horticultural Society of Queensland	G. K. Seabrook	21 and 22 April and 10 Oct.
Brisbane ...	Moreton Agricultural, Horticultural, and Industrial Association	J. Duffield	
Brisbane ...	Queensland Acclimatisation Society	E. Grimley	
Brisbane ...	Queensland Fruit and Economic Plant Growers' Association	G. K. Seabrook	
Brisbane ...	National Agricultural and Industrial Association of Queensland	H. C. Wood	10, 11, and 12 Aug.
Brisbane ...	Queensland Stockbreeders' and Graziers' Association	F. A. Blackman	
Brisbane ...	United Pastoralists' Association	Fredk. Ranson	
Bundaberg ...	Bundaberg Agricultural and Pastoral Society	A. McIntosh	12, 13, and 14 Oct.
Bundaberg ...	Bundaberg Horticultural and Industrial Society	H. E. Ashley... ..	
Bundaberg ...	Woongarra Canegrowers' and Farmers' Association	H. Cattermull	
Burpengary...	Burpengary Farmers' Association	C. H. Ham	
Caboolture ...	Caboolture Farmers' Association	G. Mallet	
Cairns ...	Barron Valley Farmers' and Progress Association	W. F. Logan... ..	
Cairns ...	Cairns Agricultural, Pastoral, and Mining Association	A. J. Draper	28 and 29 Sept.
Cairns ...	Hambledon Planters' Association	E. Whitehouse	
Charleville ..	Centra Warrego Pastoral and Agricultural Association	A. J. Carter	25 and 26 May
Charters Towers	Towers Pastoral, Agricultural, and Mining Association	W. Tilley	
Childers ...	Isis Agricultural Association	H. Epps	
Childers ...	Childers Progress Branch, Isis Agricultural Association	N. Rosenlund	
Childers ...	Doolbi Mill Branch, Isis Agricultural Association	W. T. H. Job	
Childers ...	Childers Mill Branch, Isis Agricultural Association	H. Epps	
Clermont ...	Peak Downs Pastoral, Horticultural, and Agricultural Society	F. Leysley	
Clermont ...	Peak Downs Dairymen and Settlers' Association	A. G. Pursell	
Cooktown ...	Cook District Pastoral and Agricultural Society	W. R. Humphreys	
Cordalba ...	Cordalba Farmers' Association	B. Goodliffe	
Currajong ...	Currajong Farmers' Progress Association ...	Wm. Howard	
Cunnamulla	South Warrego Pastoral Association	J. Winward	
Degilbo ...	Degilbo Farmers' Progress Association	F. A. Griffiths	
Gayndah ...	Gayndah Agricultural and Horticultural Association	J. C. Kerr	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Gin Gin ...	Pastoral and Agricultural Society of Gin Gin	E. K. Wollen ...	
Gladstone ...	Gladstone Pastoral and Agricultural Association	W. J. Manning ...	
Gooburrum, Bundaberg	Gooburrum Farmers' and Canegrowers' Association	W. J. Tutin ...	
Goondiwindi	MacIntyre River Pastoral and Agricultural Society	A. Gough ...	
Gympie ...	Agricultural, Mining, and Pastoral Society	F. Vaughan ...	14 and 15 Sept.
Gympie ...	Gympie Horticultural Society ...	W. G. Ambrose ...	
Helidon ...	Helidon Scrub Farmers' Progress Association	M. Morgan ...	
Herbert River	Halifax Planters' Club ...	H. G. Faithful ...	
Herbert River	Macnade Farmers' Association...	E. C. Biggs ...	
Herbert River	Ripple Creek Farmers' Association ...	J. W. Grimes ...	
Herberton ...	Mining, Pastoral, and Agricultural Association	John M. Hollway ...	11 and 12 April
Hughenden...	Hughenden Pastoral and Agricultural Association	W. H. Mulligan ...	10 and 11 May
Ingham ...	Herbert River Farmers' Association ...		
Ingham ...	Herbert River Pastoral and Agricultural Association	P. S. Cochrane ...	3 Sept.
Ipswich ...	Ipswich and West Moreton Agricultural and Horticultural Society	P. W. Cameron ...	6 Oct.
Ipswich ...	Queensland Pastoral and Agricultural Society	Elias Harding ...	1 and 2 June
Kalkie (Bundaberg)	Woongarra Canegrowers' and Farmers' Association	O. H. A. Kraak ...	
Kandanga (near Gympie)	Kandanga Farmers' Association ...	N. Rasmussen ...	
Kolan ...	Kolan Canegrowers' and Farmers' Association	C. Marks ...	
Laidley ...	Lockyer Agricultural and Industrial Society	John Fielding ...	27 and 28 July
Loganholme...	Logan Farming and Industrial Association ...	F. W. Peek ...	
Longreach ...	Longreach Pastoral and Agricultural Society	J. P. Peterson ...	12 April
Lucinda Point	Victoria Farmers' Association ...	W. S. C. Warren ...	
Mackay ..	Agricultural, Pastoral, and Mining Association	F. Black ...	
Mackay ...	Pioneer River Farmers' Association ...	E. Swayne ...	
Maryborough	Maryborough Horticultural Society ...	H. A. Jones ...	
Maryborough	Wide Bay and Burnett Pastoral and Agricultural Society	G. Willey ...	27, 28, and 29 July
Milbong ...	Milbong Farmers' Association ...	T. R. Garrick ...	
Mitchell ...	Mitchell and Maranoa Pastoral, Agricultural, and Vinegrowers' Association	H. J. Corbett ...	
Mosman River	Mosman River Farmers' Association ...		
Mount Mee...	Mount Mee Farmers' Association ...	R. Thomas ...	
Mount Morgan	Mount Morgan Mining, Agricultural, Poultry, Pastoral, and Horticultural Society	G. Orford ...	
Mulgrave ...	Mulgrave River Farmers' Association ...	Thos. Swan ...	
Nerang ...	South Queensland and Border Pastoral and Agricultural Society	W. J. Browne ...	
North Isis ...	North Isis Canegrowers' Association ...	W. J. Young ...	
Pialba ...	Pialba Farmers' Association ...	J. B. Stephens ...	
Pinbarren ...	Pinbarren Agricultural and Progress Association	H. Armitage, senr. ...	
Rockhampton	Central Queensland Farmers' and Selectors' Association	T. Whitely, Coowonga	
Rockhampton	Central Queensland Pastoral Employers' Association	G. Mackay ...	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Date of Show.
Rockhampton	Central Queensland Stockowners' Association	R. R. Dawbarn ...	10 and 11 May
Rockhampton	Rockhampton Agricultural Society	R. R. Dawbarn ...	
Roma ...	Western Queensland Pastoral and Agricultural Association	H. K. Alford ...	10 and 11 May
Roma ...	Yingerbay Farmers' Association	F. E. Glazier... ..	25 Aug.
Rosewood ..	Farmers' Club	P. H. Adams... ..	
Springsure ...	Queensland Pastoral Society	G. R. Milliken ...	2, 3, and 4 Aug.
Stanthorpe ...	Border Agricultural, Pastoral, and Mining Society	Geo. Simcocks ...	
Stanthorpe ...	Stanthorpe Horticultural and Viticultural Society	R. Hoggan	25 and 26 Jan., 1899
St. George ...	Balonne Pastoral and Agricultural Association	T. M. Cummings ...	
Toowoomba	Darling Downs Horticultural Association ...	H. Hopkins	6 Aug.
Toowoomba	Drayton and Toowoomba Agricultural and Horticultural Society	H. Symes	
Toowoomba	Royal Agricultural Society of Queensland ...	F. Burt	25 and 26 Jan., 1899
Townsville ...	Townsville Pastoral, Agricultural, and Industrial Association (formerly North Queensland Pastoral and Agricultural Association)	J. N. Parkes	
Wallumbilla	Wallumbilla Farmers' Association	P. W. Howse	6 Aug.
Warwick ...	Eastern Downs Horticultural and Agricultural Association	J. Selke	
Wellington Point	Wellington Point Agricultural, Horticultural, and Industrial Association	J. B. Blaine	25 and 26 Jan., 1899
Woombye ...	Woombye Fruitgrowers' Association	P. S. Hungerford ...	
Woowoonga	Woowoonga Scrub Farmers' Association ...	H. B. Griffiths ...	25 and 26 Jan., 1899

The Markets.

AVERAGE PRICES FOR OCTOBER.

Article.										OCTOBER.		
										Top Prices.		
										£	s.	d.
Bacon	...	...	...	...	...	...	...	...	lb.	0	0	6 ⁷ / ₈
Bran	...	...	...	...	...	...	...	...	ton	4	18	1 ¹ / ₂
Butter, First	...	...	...	...	...	...	...	...	lb.	0	0	11
Butter, Second	...	...	...	...	...	...	...	...	"	0	0	7 ³ / ₈
Chaff, Mixed	...	...	...	...	...	...	...	...	ton	3	11	3
Chaff, Oaten	...	...	...	...	...	...	...	...	"	4	0	0
Chaff, Lucerne	...	...	...	...	...	...	...	...	"	3	7	6
Chaff, Wheaten	...	...	...	...	...	...	...	...	"	2	10	0
Cheese	...	...	...	...	...	...	...	...	lb.	0	0	9 ³ / ₄
Flour	...	...	...	...	...	...	...	...	ton	10	5	0
Hay, Oaten	...	...	...	...	...	...	...	...	"	3	10	0
Hay, Lucerne	...	...	...	...	...	...	...	...	"	2	11	3
Honey	...	...	...	...	...	...	...	...	lb.	0	0	2
Japan Rice, Bond	...	...	...	...	...	...	...	...	ton	18	5	0
Maize	...	...	...	...	...	...	...	...	bush.	0	3	7
Oats	...	...	...	...	...	...	...	...	"	0	3	6 ¹ / ₄
Pollard	...	...	...	...	...	...	...	...	ton	5	1	3
Potatoes	...	...	...	...	...	...	...	...	"	10	7	6
Potatoes, Sweet	...	...	...	...	...	...	...	...	"	2	15	0
Pumpkins, Table	...	...	...	...	...	...	...	...	"	...	...	...
Sugar, White	...	...	...	...	...	...	...	...	"	14	7	6
Sugar, Yellow	...	...	...	...	...	...	...	...	"	11	5	0
Sugar, Ration	...	...	...	...	...	...	...	...	"	9	10	0
Wheat	...	...	...	...	...	...	...	...	bush.	0	3	0 ³ / ₄
Onions	...	...	...	...	...	...	...	...	cwt.	0	16	1 ¹ / ₂
Hams	...	...	...	...	...	...	...	...	lb.	0	0	9 ¹ / ₄
Eggs	...	...	...	...	...	...	...	...	doz.	0	0	6 ³ / ₈
Fowls	...	...	...	...	...	...	...	...	pair	0	3	9
Geese	...	...	...	...	...	...	...	...	"	0	5	4 ¹ / ₂
Ducks, English	...	...	...	...	...	...	...	...	"	0	3	8 ¹ / ₄
Ducks, Muscovy	...	...	...	...	...	...	...	...	"	0	4	10 ¹ / ₂
Turkeys, Hens	...	...	...	...	...	...	...	...	"	0	7	0
Turkeys, Gobblers	...	...	...	...	...	...	...	...	"	0	18	0

ENOGGERA SALES

Article.								OCTOBER.		
								Top Prices.		
								£	s.	d.
Bullocks	...	...	...	...	...	...	...	5	18	9
Cows	...	...	...	...	...	...	...	3	18	1½
Wethers, Merino	...	...	...	...	...	...	...	0	14	4½
Ewes, Merino	...	...	...	...	...	...	...	0	8	9
Wethers, C.B.	...	...	...	...	...	...	...	0	15	3
Ewes, C.B.	...	...	...	...	...	...	...	0	11	8
Lambs	...	...	...	...	...	...	...	0	12	2½
Pigs	...	...	...	...	...	...	...	...		
Baconers	...	...	...	...	...	...	...	...		
Porkers	...	...	...	...	...	...	...	1	11	6
Slips	...	...	...	...	...	...	...	0	10	9

Orchard Notes for December.

By ALBERT H. BENSON.

IN the Orchard Notes for November, I called special attention to the importance of marketing fruit properly, emphasising the necessity for careful handling, even grading, and attractive packing if satisfactory prices are to be obtained. Those remarks apply equally to the present month or, in fact, to any month of the year, as there is always more or less fruit of one variety or another to be marketed; and it is simply wasting time and money cultivating, pruning, manuring, or spraying an orchard—in fact, doing everything possible to produce good fruit—if when the fruit is grown it is not put on the market in such a manner that it will realise the highest price. Careful handling, grading, packing, and marketing will secure a ready sale for good fruit in any market, even when the same fruit badly handled and unattractively got up would be unsaleable. Growers would do well to take a lesson in packing from the Californians, who have been shipping apples, or from the Italians, who are shipping lemons to this colony, as those fruits, even after a long and trying voyage and one or more transshipments, reach here in better condition and in a much more attractive state than our local fruit, which is often only carted a few miles.

Keep down pests wherever met with; gather and destroy all fly-infested fruit. Destroy orange bugs before they become mature by hand-picking or by driving them to the trunks of the trees, by tapping the outer branches with light poles, the insects being brushed off from the trunks and main branches on to a sheet placed under the tree to catch them, from which they can be easily gathered and burnt.

All caterpillars, cut-worms, beetles, grasshoppers, crickets, or other insects destroying the foliage should be destroyed by either spraying the same with Paris green, 1 oz. to 10 gallons of water, or by dusting them with a mixture of Paris green and air-slacked lime, 1 oz. of Paris green to 5 lb. of lime. Keep the orchard well cultivated, especially in the dry districts; and where there is water available for irrigation, in such districts all citrus-trees should receive a watering during the month unless there is a good fall of rain, when it will be of course unnecessary.

Pineapples, bananas, and other tropical fruit can be planted during the month, showery weather and dull days being chosen. The rainy season is the best time to transplant most tropical plants. Where it is desirable to go in for green crop manuring, or for raising a green crop for mulching, cow-peas can be sown, as they will be found to make a very rapid growth now, which will be strong enough to keep most weeds in check.

See that all surface and cut-off drains are in good working order, and not choked up with grass, weeds, &c., as heavy rain may fall during the month, and there should be a get-away for all surplus water, which would tend to either wash the soil or sour it; stagnant water round the roots of the trees being exceedingly injurious at any time, and especially so during the heat of summer.

Farm Notes for December.

THE wheat harvest will now be in full swing, and every effort should be made to get in the harvest speedily. Barley should be allowed to ripen in the field before cutting, but should be harvested as soon as the grain is hard, otherwise loss will be sustained by scattering. There being a probability of showery weather, care should be exercised in stooking, as a shower of rain will discolour what is left on the ground. After stacking, which should only be done when the barley is absolutely dry, it should remain from six weeks to two months in the stack before being thrashed. Maize may still be sown in large areas. Sow sorghum, imphee, Kafir corn, and panicum. Arrowroot, ginger, and sweet potatoes may be planted.

Too much care cannot be exercised in protecting newly dug potatoes from the sun. They should be dug as soon as the skin is firm, as they will rot if left in the ground too long during the great heat of this month. They should be dug early in the morning before the sun has gained great power, and carted to a barn, where they should be spread out to cool. Tobacco must be attended to in the manner described last month. Keep all crops clean, and thin them out if too crowded.

Garden Notes for December.

By H. W. GORRIE,
Horticulturist, Queensland Agricultural College.

THIS is a very trying month for gardens, and great difficulty is often experienced in keeping up a supply of vegetables. In the sort of weather which usually prevails at this time of the year, the value of mulching becomes apparent. People who keep cattle or horses should be able to command a supply of material suitable for mulching; and all crops liable to suffer from the effects of drought or hot winds should be protected by spreading a covering of this mulch over the ground between the rows and around the plants. The benefits of mulching, where suitable material is at hand, are many and great. The soil is kept at an equable temperature, evaporation is largely checked, and the baking of the surface, which usually occurs after watering is prevented; this last alone being a most important point in heavy, stiff soils. Where mulch is not available, the hoe and cultivator should be kept in constant use, so as to keep the surface soil well stirred and in fine tilth. This serves much the same purpose as mulching; the fine soil on the surface forming a mulch which, to a large extent, checks evaporation.

Kitchen Garden.—French beans may still be sown in moist weather, or, where plenty of water is available, the drills may be well soaked before sowing the seed. Cucumbers, melons, marrows, &c., should be well watered when necessary with liquid manure. Cucumbers should always be well watched to see that none become ripe, unless wanted for seed. As soon as they begin to ripen, the vitality and bearing capacity of the plants are very much weakened. Seeds of all these

vegetables may still be sown for succession. Tomatoes should now be in full bearing. The plants ought to be supported in some way, either by strings on stakes or by propping up with small branches like pea-sticks. By this means the fruit is easy to gather, and is kept clean. Onions should now be ready to take up and store. They ought to be spread out thinly in a dry open shed until the tops wither sufficiently to pull off easily; then graded into sizes, and sent to market or stored in a cool dry place. Maize: The sugar or sweet varieties of maize ought to be grown as summer vegetables. These are well adapted for table use, and ought to be more extensively used than is the case. It is unnecessary to say anything about their cultivation. Salads: It is almost too hot in most districts to grow lettuce or other salad plants now, unless an unlimited water supply or some little shade can be obtained.

It may be worth while to mention for the benefit of those who grow no vegetables, that the weed commonly known as "fat hen" makes an excellent table vegetable if cooked in the same way as spinach, which it then very much resembles in taste and appearance.

Flower Garden.—The chief work in the flower garden now consists of watering, stirring the soil, and removing decayed and spent flowers. Roses especially should have all spent flowers regularly cut off, as their blooming season will be thereby considerably lengthened. If aphid or Rose Scale make their appearance, spray with kerosene emulsion, taking care that the spraying is not done on very hot dry days, but in the early mornings or evenings. Chrysanthemums now require a good deal of attention such as staking, pinching, &c.; and frequent waterings with weak liquid manure should be applied. It will be found of great benefit to the plants to syringe them overhead every afternoon just before sundown. No suckers should be allowed to grow until the plants have ceased flowering; and caterpillars, aphid, &c., must be watched for and destroyed. Dahlias will require plenty of water, and an occasional dose of liquid manure. They should also be kept staked up and well supported to prevent their stems from being broken in windy weather. Bulbs which have finished flowering should have the dead leaves removed, and when quite dried up should be taken up and stored. Keep weeds well under command, as the plants usually require all the moisture in the soil at this season, and cannot afford to be robbed of any portion of their nourishment by weeds.

Public Announcements.

THE Editor will be glad to receive any papers of special merit which may be read at meetings of Agricultural and Pastoral Associations in Queensland, reserving, however, the right to decide whether their value and importance will justify their publication.

SCENT-PRODUCING PLANTS.

SEVERAL applications having been received by this Department for cuttings and plants of flowers for perfume-making, such applications being based on an article on the Dunolly Scent Farm in Victoria, applicants are informed that no such plants are as yet distributed by the Queensland Agricultural Department. If correspondents will carefully read the article on the Perfume Industry in Vol. II., Part 4, of the *Journal*, they will see that it is the Department of Agriculture of Victoria which is prepared to distribute cuttings to the number of 100 free of charge, and above that number at the rate of £2 per 1,000, at the Dunolly Farm.

If at the expiration of the said period of fourteen days, and notwithstanding they have been subjected to process or processes of disinfection, they still harbour or are infested by insect or fungus pest or disease they shall be forthwith destroyed.

When such trees or plants have been treated as hereinbefore prescribed, a certificate in one of the forms contained in Schedule 2 hereto shall forthwith be issued to the consignees, agents, or other person or persons interested.

9. Consignees or their agents shall give a delivery order to the inspector or other person authorised in that behalf for all such trees, plants, or parts thereof, as well as packages that may contain or have contained the same, in order that they may be conveyed to a place of quarantine. Consignees or their agents must pay the expense of such removal, and unpack and prepare such trees, plants, and packages for inspection, disinfection, or other treatment, as provided for in Regulation No. 8. They shall also pay all costs, charges, and expenses payable in respect of the same. If the destruction of such trees, plants, packages, or portions thereof has not been ordered, on obtaining the certificate of inspection and disinfection provided for in Regulation 8 such consignees or agents shall repack and remove the same within twenty-four hours after the receipt of such certificate.

10. All trees, plants, or parts thereof, and packages that contain or have contained the same, conveyed to any place of quarantine for the purposes of inspection, disinfection, or other treatment provided for in Regulation 8, and not so dealt with by reason of the default of the consignee or his agent to provide the necessary payment for conveyance and labour for unpacking and repacking may be destroyed by the inspector or other officer authorised in that behalf, or may be held in bond at the cost of and on behalf of the consignee or his agent.

11. All imported trees, plants, or portions thereof may be seized and destroyed by or under the authority of the Minister, should no sufficient evidence of their being included in any certificate of disinfection be tendered by their lawful owner or owners on such evidence being demanded from them.

12. Culinary vegetables, cereals, and fruit are hereby excepted from the operation of the clauses 4 to 11, inclusive, of these Regulations.

Agencies for plant distribution.

13. Every nursery where plants are raised for sale, gift, or distribution shall be registered by the owners or occupiers thereof, at the Office of the Department of Agriculture, on or before the First of January in each year.

14. Every such registered nursery shall be inspected by an officer duly authorised by the Minister, at least twice a year, at an interval of not less than one month, and in the event of the officer reporting that such nursery is free from disease, a certificate in the form prescribed in Schedule 3 hereto shall be issued to the owner or occupier thereof. In the event of such nursery being subject to disease, the officer shall forthwith give to the owner or occupier thereof written notice in the form contained in Schedule 4 hereto, to take the necessary measures for the eradication of such disease.

15. The owner or occupier of every such registered nursery who raises for sale or distribution trees, plants, or vegetables, or portions thereof, not suitable for immediate culinary purposes, shall give to the party immediately concerned in any transaction, whether of gift, sale, or exchange for valuable consideration of any such trees, plants, or vegetables, a written guarantee in the form contained in Schedule 5 hereto, certifying his nursery is duly registered, and that the trees, plants, or vegetables have been disinfected by him, or his agents, by any one or more of the methods prescribed by Schedule 1 hereto, and that they are free from disease, and are in a vigorous and healthy condition.

16. All market gardens devoted exclusively to the cultivation of culinary vegetables, and all other gardens so far as relate to these kinds of plants, shall be excepted from the operation of the next preceding three clauses of these Regulations.

17. No person shall sell or dispose of, or offer for sale, any tree, plant, or vegetable, or portion thereof, infested with or infected by any disease.

Fruit fly.

18. All fallen fruit, of whatever kind (and whether harbouring insects or not), shall be gathered before noon of each day by the occupier or owner, or his or her agent, of any place where fruit trees are being grown, and all pest-infected fruit shall be submitted to the process of boiling, or be buried beneath not less than one foot six inches of solid earth.

SCHEDULE 1.

DISINFECTION OF PLANTS AT PLACE OF ENTRY AND AT NURSERIES.

A. They shall be disinfected by being dipped for a period of not less than two minutes in a solution of 1 lb. of whale oil or any similar soap (80 per cent.) to every gallon of water. The said solution to be kept at a temperature of 115 to 120 degrees Fahrenheit.

B. Or in addition to being disinfected as prescribed in A, they shall be further disinfected by fumigation with hydrocyanic acid gas as follows:—They shall be placed in an airtight box; for each and every 100 cubic feet of space contained therein shall be used for

Plants in pots or in leaf

400 grains of fused cyanide of potassium (98 per cent.) with $1\frac{1}{2}$ oz. of fluid sulphuric acid, 3 oz. of water:

Fruit trees and shrubs,

530 grains of fused cyanide of potassium (98 per cent.) with $1\frac{3}{4}$ oz. of fluid sulphuric acid, $3\frac{1}{2}$ oz. of water. The sulphuric acid and water shall be placed in an earthenware vessel in the box, the cyanide of potassium shall be added and the box immediately closed tightly, and shall remain so for not less than sixty minutes.

SCHEDULE 2.

Place of Entry:

Date:

This is to certify that the trees or plants imported into _____ by _____ have been inspected by me, and that they have been disinfected as set forth in Schedule 1.

Signed:

Date:

SCHEDULE 3.

This is to certify that the nursery situated at _____, and of which _____ is the registered owner or occupier thereof, has been inspected by me this day, and has been found to be free from disease.

Signed:

Date:

SCHEDULE 4.

ORDER TO ERADICATE DISEASE.

I, _____, being a duly authorised person, hereby give you _____, of _____, notice that your orchard is diseased with _____, and I order you to take the following measure or measures within _____, for the eradication of such disease or diseases:—

(a) All fallen fruit of whatever kind (and whether harbouring insects or not) shall be gathered before noon of each day and all pest-infested fruit shall be submitted to the process of boiling or be buried beneath not less than one foot six inches of solid earth:

(b) The trees shall be sprayed with one of the following mixtures (*the number of sprayings and intervals between sprayings to be stated*):—

1.—*Resin wash for scale insects.*

Take 20 lb. of resin, 6 lb. of caustic soda (70 per cent.), 3 pints of fish oil, water to make 80 gallons. Place the resin, caustic soda, and fish oil in a large boiler with 20 gallons of water, and boil for three hours, then add hot water slowly and stir well till there are at least 40 gallons of hot solution; then add cold water to make up the total to 80 gallons. Never add cold water when cooking or the resin will be precipitated, and it will be difficult to get it in solution. The above is the strength to use for citrus trees; a winter wash for deciduous trees may be used one-half stronger, the total amount being made up to 54 gallons instead of 80 gallons.

Public Announcements.

THE Editor will be glad to receive any papers of special merit which may be read at meetings of Agricultural and Pastoral Associations in Queensland, reserving, however, the right to decide whether their value and importance will justify their publication.

GOVERNMENT AGRICULTURAL LABORATORY.

INSTRUCTION FOR THE COLLECTION OF SAMPLES, AND SCALE OF FEES.

GENERAL INSTRUCTIONS.

1. All analyses are carried out in their turn as they arrive at the Laboratory.

2. Should a customer wish for an immediate analysis, the fee, as provided by scale of fees below, will be increased by 50 per cent.

3. The samples may be forwarded by parcel post or by rail, either to the Under Secretary for Agriculture, Brisbane, or direct to the Chemist, Agricultural Laboratory, at the Agricultural College, Gatton; but in any case the required fee must be transmitted at the same time.

4. Analyses will be only carried out, if samples are taken strictly in accordance with the instructions issued below.

SCALE OF FEES.

						Farmers, Selectors, Gardeners.		
						£	s.	d.
Soil—Short analysis (estimation of	lime,	alkalies,						
nitrogen, and phosphoric acid)	...	...	...	...	...	2	2	0
Soil and Subsoil—Short analysis	...	...	...	...	...	3	3	0
Soil—Complete analysis	...	...	...	...	...	4	4	0
Water—Analysis	...	...	...	...	...	3	3	0
Manures—								
Complete analysis	...	...	...	...	...	2	2	0
Nitrogen only	...	...	...	...	...	0	7	6
Potash only	...	...	...	...	...	0	7	6
Phosphoric acid sol.	...	...	...	...	...	0	15	0
Phosphoric acid insol.	...	...	...	...	...	0	15	0
Food Stuffs—								
Complete analysis	...	...	...	...	...	2	2	0
Water only	...	...	...	...	...	0	5	0
Albuminoids	...	...	...	...	...	0	10	0
Oil or fat	...	...	...	...	...	0	7	6
Ash	...	...	...	...	...	0	5	0
Fibre	...	...	...	...	...	0	7	6
Sugar-cane, sugar-beet, megass—Analysis of	...	...	...	...	...	1	1	0
Sugar, massecuite, jelly, molasses	...	...	...	...	...	1	1	0
Milk, butter, cheese—Complete analysis	...	...	...	...	...	1	0	0
Tanning materials (tannin estim.)	...	...	...	...	...	1	0	0
Soaps	...	...	...	...	...	1	10	0
Limestone, cement, clay, &c...	...	...	...	...	...	3	0	0

INSTRUCTIONS FOR TAKING AND COLLECTING OF SAMPLES.

SOILS AND SUBSOILS.

To obtain a fair average sample of the soil of a block of land, as near as possible, equal quantities of soil are taken from various parts of the fields.

A sketch plan of the field, paddock, or block of land on which the samples were taken should accompany the samples, and the spots where samples are taken are marked on this plan and numbered. This sketch plan should also indicate position of roads, creeks, gullies, ridges, general fall of the land, &c.

Should the soil in various parts of the block show a very marked difference, it will be necessary to divide the block into two, rarely in more, parts. Should the different soil occur only in a small patch, this sample may be left out.

Not less than three samples should be taken in each section. A greater number is to be preferred, as a better average will be obtained.

At the places chosen for the taking of the samples the surface is slightly scraped with a sharp tool, to remove any surface vegetation which has not as yet become part of the soil.

Vertical holes from 10 to 18 inches square are dug in the ground to a depth of 2 feet 6 inches to 3 feet.

The holes are dug out like post-holes; an earth-auger facilitates the operation considerably, and the holes may be trimmed with the spade afterwards.

Careful note of the appearance of the freshly cut soil and subsoil should be taken. The depth of the real soil, which in most cases is easily distinguished, is also measured and noted for each hole. Note how deep the roots of the surface vegetation reach into the soil. If the soil changes gradually into the subsoil, as is the case in some places where the soil is of very great depth, this line of division is guessed approximately, or it is best to take the soil uniformly to a depth of 12 inches.

With a spade a slice of soil is now cut off and put on to a clean bag. The same is done with the subsoil, and the slice is taken from where the soil ends (or 12 inches) to the bottom of the hole, and this subsoil placed on another bag. Stones over the size of a pea may be picked out, the rough quantity of such stones estimated, and a few enclosed with the samples. Fine roots must not be taken out from the soil samples. The same operation is repeated at the other places chosen. Careful note and description in each hole, as numbered and marked on plan given, and the samples of soil collected on the one bag thoroughly mixed by breaking up any large clods, and about 10 lb. of the mixture put into a clean canvas bag, which is securely tied up and labelled. The same is done with the samples of subsoil collected on the other bag.

All the samples collected are afterwards placed into a wooden box.

It is important to use clean bags and clean boxes, and also that the samples should not be left in the neighbourhood of stables or manure heaps. A short description of the land must accompany the samples and the sketch plan.

In the case of cultivated land, state how long the land was under cultivation, what crops were chiefly grown, result of such crops, was any manure applied, when, and what sort, and in what quantities per acre. In the case of virgin soil, state if the land was heavily timbered or not, ringbarked, if scrub or forest land, what sort of timber was chiefly growing on the land. In all cases a description of the neighbouring land, outcropping rocks, &c., are of great value. Also state if the land is naturally or artificially drained or not; describe the land as regards its position to hills, roads, creeks, ridges, &c. Only by adhering strictly to these instructions, and by giving minute details, benefit can be derived from the soil analyses.

WATER.

It is best to collect and forward samples of water for analysis in stoppered glass bottles, generally known as Winchester quarts.

The bottles have to be perfectly clean, and stoppers must fit well. Corks should be avoided, but if used must be new and well washed with the water before being used for closing the bottle.

When taking waters from taps, pumps, bores, the water has to be allowed to run for a while before taking the sample. When taking the water out of a well, pond, or river, the bottle is completely immersed, but care has to be taken not to disturb the mud or sediment at the bottom of the water. Before the sample is actually collected, the bottle is rinsed three times with the water,

filling each time about one-third full. The bottle is then filled within about 1 inch from the top; the stopper is inserted and securely tied down with a clean piece of linen or calico.

The stopper must not be fastened or luted with sealing-wax, paste, plaster of paris, &c.

MANURES.

When taking samples of artificial manures out of bags, the sample must be taken from different bags and at different places of the bag and not only from the top, or the bags before being used are emptied on a heap and mixed up well and the sample then taken. About 1 to 2 lb. put into a clean bag should be forwarded for analysis.

FOOD STUFFS.

It is always important to obtain good average samples, and this can only be done by great care in taking the samples from different places, mixing well, and taking a small part of the mixture. This method would apply to any dry food-stuff—as grains of any kind, peas, beans, chaff, pollard, meal, &c. For the analysis of green foods—as green hay, sorghum, silage—it is best to make a mixture of the sample by passing it through a chaffcutter, and by taking an accurately weighed quantity—say 1 lb. This quantity may then be dried in the sun, taking care that nothing is lost, and when dry put in a bag and forwarded for analysis. The green samples may also be forwarded without drying in fruit-preserving jars.

To collect information about value of *green manures*, it is best to plot out exactly one square yard in the field covered with the plant, not picking out a position where the growth is very heavy or poor, but about a fair average. Four pegs are driven into the ground at the four corners, and string stretched between them; with a sharp spade all the plants are cut along the strings, so as to get really the growth of one square yard. The plants are all collected and accurately weighed, passed through a chaffcutter, and the sample for analysis taken as above described. In many cases the roots may be also pulled out, weighed separately, and a sample forwarded.

The samples have to be accompanied by a description of the crop—when planted, how old when cut, if the land was manured or not, weight of crop per acre or per square yard, and weight of the sample forwarded when in its green state. In the case of green manures it is generally best to take the samples at the same time when ploughed under, just after flowering.

“THE DISEASES IN PLANTS ACT OF 1896.”

Department of Agriculture,
Brisbane. 11th September, 1897.

HIS Excellency the Governor, with the advice of the Executive Council, and in pursuance of the provisions of “*The Diseases in Plants Act of 1896*,” has been pleased to make the following Regulations.

J. F. G. FOXTON.

REGULATIONS.

Interpretation.

1. In these Regulations, unless the context otherwise indicates, the following terms shall have and include the meanings set against them respectively, that is to say:—

“Act”—“*The Diseases in Plants Act of 1896*”;

“Minister”—The Secretary for Agriculture or other Minister for the time being charged with the administration of the Act;

“Inspector”—Any Inspector appointed under the Act;

“Place of Entry”—Brisbane, Cairns, and such other place as may be appointed by the Minister;—

and words importing the singular number shall include the plural, and words importing the plural shall include the singular, and words importing the masculine gender shall include females.

Importations prohibited.

2. The importation is hereby prohibited of all trees, plants, or portion thereof, including fruit or seeds (other than those manufactured) from Ceylon, India, East Indies, East African Colonies, and all other countries in which the coffee leaf disease (*Hemeleia vastatrix*) is known to exist. Provided always that the Minister may, at his discretion, import from any of such countries coffee seed and trees, plants, vegetables, or portions thereof, all of which shall, when so imported, be suitably disinfected and detained, and grown in close quarantine for not less than twelve calendar months.

Special importations prohibited.

3. The importation is hereby prohibited of the following plants :—

- (a) Sugar-cane and banana plants grown in New Guinea, Sandwich Islands, Fiji, or other country in which the beetle borer of sugar-cane (*Sphenophorus obscurus*) exists ;
- (b) Potatoes from Europe and America, and all other countries in which the disease caused by *Phytophthorus infestans* exists ;
- (c) Plants or portions of plants of all and every species of *Vitis* from Europe, Asia Minor, America, Cape of Good Hope, New South Wales, Victoria, and New Zealand, and all other countries in which *Phylloxera vastatrix* is known to exist.

Provided always that the Minister may, at his discretion, import from any of the said places any of the plants mentioned in this Regulation, all of which plants shall, when so imported, be suitably disinfected, detained, and grown as directed in the next preceding clause.

Importations.

4. Trees, plants or portions thereof that are being introduced into the colony shall be received at a place of entry and not elsewhere.

5. All parcels of trees, plants, or any portion thereof, as well as all packages that contain any such articles introduced from beyond the limits of the colony shall on their arrival be distinctly marked with the name of the place or places where the said trees or plants have been grown, and in the case of such as are being introduced, or are being transmitted through the Post Office, the nature of their contents shall in addition be similarly set forth upon them.

6. All consignees, agents, or other persons interested shall within twenty-four hours notify the Minister or some person authorised by him of the arrival of any tree or plant, or any portion thereof, from beyond the colony at a place of entry, or through the Post Office, and shall not take possession of the same or any package that may contain or have contained the same until a certificate has been issued setting forth the fact that the said articles have been inspected and disinfected or otherwise dealt with as hereinafter provided in Regulation 8.

The officers in charge of Post Offices at the places of entry shall likewise, within twenty-four hours, notify the Minister or _____ of the arrival from beyond the colony of any tree, plant, or portion thereof, or of parcels containing the same, and shall detain the same until otherwise authorised by him or _____.

7. At the places of entry all trees, plants, or any portion thereof, and the packages that contain or have contained the same, shall on their arrival be detained at a place of quarantine for the purposes of inspection, disinfection, or being otherwise dealt with, as provided for in these Regulations.

8. All trees, plants, or any part thereof, and the packages that contain or have contained the same, imported or introduced into the colony shall be subject to detention and inspection by some person authorised by the Minister at any of the places of entry, and shall be subject to treatment by such person as follows, that is to say—

- (1) If such trees or plants be found on inspection to be subject to any disease not already known to exist in the colony, but liable if introduced and established to become prejudicial to its agricultural or horticultural interests, they shall be forthwith destroyed ;

But in all other cases, and whether diseased or otherwise, they shall on inspection be detained and immediately afterwards disinfected in accordance with any one or more of the methods for disinfection prescribed in Schedule No. 1 hereto.

- (2) If such trees or plants be found on inspection to be subject to any disease they shall, notwithstanding they have been disinfected, be further detained for a period of not less than fourteen days.

2.—*Sulphur, lime, and salt wash.*

Take 40 lb. of unslacked lime, 20 lb. of sulphur, 15 lb. of salt, and 50 gallons of water.

To mix take 10 lb. of lime, 20 lb. of sulphur, and 20 gallons of water; boil for not less than one hour and a-half, or until the sulphur is thoroughly dissolved, when the mixture will be of a light-amber colour. Slack 30 lb. of lime in a barrel with hot water, and when thoroughly slacked, but still boiling, add the 15 lb. of salt; when this is dissolved, the whole should be added to the lime and sulphur in the boiler, and the whole boiled for half-an-hour longer, when water to make the whole up to 50 gallons should be added. Strain through a wire sieve, and keep well stirred whilst in use.

3.—*Bordeaux mixture.*

Winter strength—6 lb. bluestone, 4 lb. of unslacked lime, 22 gallons of water.

Summer strength—6 lb. bluestone, 4 lb. of unslacked lime, 40 gallons of water.

Prepare as follows (for the 40 gallons solution, the 22 gallons solution in proportion):—

(1.) Dissolve 6 lb. of bluestone in 20 gallons of cold water in one cask, by placing it in a bag and suspending it in the water.

(2.) Slack 4 lb. of unslacked lime in another cask slowly by first pouring about 3 pints of water over it. This will reduce the lime to a thick cream, free from lumps. Water should now be added, stirring well till there is 20 gallons of milk of lime in the cask.

(3.) Stir the milk of lime up well, strain it, and pour the whole of the 20 gallons of milk of lime and the 20 gallons of bluestone water together slowly into a third cask, stir well for three minutes, and if properly made the mixture is fit for use.

4.—Any other mixture, particulars to be filled in by a duly authorised person.

5.—Fumigation with hydrocyanic acid gas, particulars to be filled in by a duly authorised person.

SCHEDULE 5.

This is to certify that [I or we] have duly registered [my or our] nursery situated at _____, and that [I or we] have disinfected the plants or trees sold this day to _____, of _____, by one or other of the methods prescribed by Schedule 1 of the Regulations under "*The Diseases in Plants Act of 1896*," and that the said trees or plants are free from disease and are in a healthy and vigorous condition.

Signed:

Date:

The officers in charge of Post Offices at the places of entry shall likewise, within twenty-four hours, notify the Minister or _____ of the arrival from beyond the colony of any tree, plant, or portion thereof, or of parcels containing the same, and shall detain the same until otherwise authorised by him or _____.

7. At the places of entry all trees, plants, or any portion thereof, and the packages that contain or have contained the same, shall on their arrival be detained at a place of quarantine for the purposes of inspection, disinfection, or being otherwise dealt with, as provided for in these Regulations.

8. All trees, plants, or any part thereof, and the packages that contain or have contained the same, imported or introduced into the colony shall be subject to detention and inspection by some person authorised by the Minister at any of the places of entry, and shall be subject to treatment by such person as follows, that is to say—

- (1) If such trees or plants be found on inspection to be subject to any disease not already known to exist in the colony, but liable if introduced and established to become prejudicial to its agricultural or horticultural interests, they shall be forthwith destroyed ;

But in all other cases, and whether diseased or otherwise, they shall on inspection be detained and immediately afterwards disinfected in accordance with any one or more of the methods for disinfection prescribed in Schedule No. 1 hereto.

- (2) If such trees or plants be found on inspection to be subject to any disease they shall, notwithstanding they have been disinfected, be further detained for a period of not less than fourteen days.

If at the expiration of the said period of fourteen days, and notwithstanding they have been subjected to process or processes of disinfection, they still harbour or are infested by insect or fungus pest or disease they shall be forthwith destroyed.

When such trees or plants have been treated as hereinbefore prescribed, a certificate in one of the forms contained in Schedule 2 hereto shall forthwith be issued to the consignees, agents, or other person or persons interested.

9. Consignees or their agents shall give a delivery order to the inspector or other person authorised in that behalf for all such trees, plants, or parts thereof, as well as packages that may contain or have contained the same, in order that they may be conveyed to a place of quarantine. Consignees or their agents must pay the expense of such removal, and unpack and prepare such trees, plants, and packages for inspection, disinfection, or other treatment, as provided for in Regulation No. 8. They shall also pay all costs, charges, and expenses payable in respect of the same. If the destruction of such trees, plants, packages, or portions thereof has not been ordered, on obtaining the certificate of inspection and disinfection provided for in Regulation 8 such consignees or agents shall repack and remove the same within twenty-four hours after the receipt of such certificate.

10. All trees, plants, or parts thereof, and packages that contain or have contained the same, conveyed to any place of quarantine for the purposes of inspection, disinfection, or other treatment provided for in Regulation 8, and not so dealt with by reason of the default of the consignee or his agent to provide the necessary payment for conveyance and labour for unpacking and repacking may be destroyed by the inspector or other officer authorised in that behalf, or may be held in bond at the cost of and on behalf of the consignee or his agent.

11. All imported trees, plants, or portions thereof may be seized and destroyed by or under the authority of the Minister, should no sufficient evidence of their being included in any certificate of disinfection be tendered by their lawful owner or owners on such evidence being demanded from them.

12. Culinary vegetables, cereals, and fruit are hereby excepted from the operation of the clauses 4 to 11, inclusive, of these Regulations.

Agencies for plant distribution.

13. Every nursery where plants are raised for sale, gift, or distribution shall be registered by the owners or occupiers thereof, at the Office of the Department of Agriculture, on or before the First of January in each year.

14. Every such registered nursery shall be inspected by an officer duly authorised by the Minister, at least twice a year, at an interval of not less than one month, and in the event of the officer reporting that such nursery is free from disease, a certificate in the form prescribed in Schedule 3 hereto shall be issued to the owner or occupier

thereof. In the event of such nursery being subject to disease, the officer shall forthwith give to the owner or occupier thereof written notice in the form contained in Schedule 4 hereto, to take the necessary measures for the eradication of such disease.

15. The owner or occupier of every such registered nursery who raises for sale or distribution trees, plants, or vegetables, or portions thereof, not suitable for immediate culinary purposes, shall give to the party immediately concerned in any transaction, whether of gift, sale, or exchange for valuable consideration of any such trees, plants, or vegetables, a written guarantee in the form contained in Schedule 5 hereto, certifying his nursery is duly registered, and that the trees, plants, or vegetables have been disinfected by him, or his agents, by any one or more of the methods prescribed by Schedule 1 hereto, and that they are free from disease, and are in a vigorous and healthy condition.

16. All market gardens devoted exclusively to the cultivation of culinary vegetables, and all other gardens so far as relate to these kinds of plants, shall be excepted from the operation of the next preceding three clauses of these Regulations.

17. No person shall sell or dispose of, or offer for sale, any tree, plant, or vegetable, or portion thereof, infested with or infected by any disease.

Fruit fly.

18. All fallen fruit, of whatever kind (and whether harbouring insects or not), shall be gathered before noon of each day by the occupier or owner, or his or her agent, of any place where fruit trees are being grown, and all pest-infected fruit shall be submitted to the process of boiling, or be buried beneath not less than one foot six inches of solid earth.

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DISINFECTION OF PLANTS AT PLACE OF ENTRY AND AT NURSERIES.

A. They shall be disinfected by being dipped for a period of not less than two minutes in a solution of 1 lb. of whale oil or any similar soap (80 per cent.) to every gallon of water. The said solution to be kept at a temperature of 115 to 120 degrees Fahrenheit.

B. Or in addition to being disinfected as prescribed in A, they shall be further disinfected by fumigation with hydrocyanic acid gas as follows:—They shall be placed in an airtight box; for each and every 100 cubic feet of space contained therein shall be used for

Plants in pots or in leaf

400 grains of fused cyanide of potassium (98 per cent.) with $1\frac{1}{2}$ oz. of fluid sulphuric acid, 3 oz. of water:

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530 grains of fused cyanide of potassium (98 per cent.) with $1\frac{3}{4}$ oz. of fluid sulphuric acid, $3\frac{1}{2}$ oz. of water. The sulphuric acid and water shall be placed in an earthenware vessel in the box, the cyanide of potassium shall be added and the box immediately closed tightly, and shall remain so for not less than sixty minutes.

SCHEDULE 2.

Place of Entry :

Date :

This is to certify that the trees or plants imported into _____ by _____ have been inspected by me, and that they have been disinfected as set forth in Schedule 1.

Signed :

Date : _____

SCHEDULE 3.

This is to certify that the nursery situated at _____, and of which _____ is the registered owner or occupier thereof, has been inspected by me this day, and has been found to be free from disease.

Signed :

Date :

Public Announcements.

THE Editor will be glad to receive any papers of special merit which may be read at meetings of Agricultural and Pastoral Associations in Queensland, reserving, however, the right to decide whether their value and importance will justify their publication.

THE *Queensland Agricultural Journal* will be supplied to all members of Agricultural and Horticultural Societies who do not derive their livelihood solely from the land, on payment, in advance, of an annual subscription of 5s.

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						Farmers, Selectors, Gardeners.		
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Soil—Short analysis (estimation of	lime,	alkalies,				2	2	0
nitrogen, and phosphoric acid)	...	...	...	...	...	2	2	0
Soil and Subsoil—Short analysis	...	...	...	...	...	3	3	0
Soil—Complete analysis	...	...	...	...	...	4	4	0
Water—Analysis	...	...	...	...	...	3	3	0
Manures—								
Complete analysis	...	...	...	...	...	2	2	0
Nitrogen only	...	...	...	...	...	0	7	6
Potash only	...	...	...	...	...	0	7	6
Phosphoric acid sol.	...	...	...	...	...	0	15	0
Phosphoric acid insol.	...	...	...	...	...	0	15	0
Food Stuffs—								
Complete analysis	...	...	...	...	...	2	2	0
Water only	...	...	...	...	...	0	5	0
Albuminoids	...	...	...	...	...	0	10	0
Oil or fat	...	...	...	...	...	0	7	6
Ash	...	...	...	...	...	0	5	0
Fibre	...	...	...	...	...	0	7	6
Sugar-cane, sugar-beet, megass—Analysis of	...	...	...	...	...	1	1	0
Sugar, massecuite, jelly, molasses	...	...	...	...	...	1	1	0
Milk, butter, cheese—Complete analysis	...	...	...	...	...	1	0	0
Tanning materials (tannin estim.)	...	...	...	...	...	1	0	0
Soaps	...	...	...	...	...	1	10	0
Limestone, cement, clay, &c....	...	...	...	...	...	3	0	0

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A sketch plan of the field, paddock, or block of land on which the samples were taken should accompany the samples, and the spots where samples are taken are marked on this plan and numbered. This sketch plan should also indicate position of roads, creeks, gullies, ridges, general fall of the land, &c.

Should the soil in various parts of the block show a very marked difference, it will be necessary to divide the block into two, rarely in more, parts. Should the different soil occur only in a small patch, this sample may be left out.

Not less than three samples should be taken in each section. A greater number is to be preferred, as a better average will be obtained.

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The holes are dug out like post-holes; an earth-auger facilitates the operation considerably, and the holes may be trimmed with the spade afterwards.

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With a spade a slice of soil is now cut off and put on to a clean bag. The same is done with the subsoil, and the slice is taken from where the soil ends (or 12 inches) to the bottom of the hole, and this subsoil placed on another bag. Stones over the size of a pea may be picked out, the rough quantity of such stones estimated, and a few enclosed with the samples. Fine roots must not be taken out from the soil samples. The same operation is repeated at the other places chosen. Careful note and description in each hole, as numbered and marked on plan given, and the samples of soil collected on the one bag thoroughly mixed by breaking up any large clods, and about 10 lb. of the mixture put into a clean canvas bag, which is securely tied up and labelled. The same is done with the samples of subsoil collected on the other bag.

All the samples collected are afterwards placed into a wooden box.

It is important to use clean bags and clean boxes, and also that the samples should not be left in the neighbourhood of stables or manure heaps. A short description of the land must accompany the samples and the sketch plan.

In the case of cultivated land, state how long the land was under cultivation, what crops were chiefly grown, result of such crops, was any manure applied, when, and what sort, and in what quantities per acre. In the case of virgin soil, state if the land was heavily timbered or not, ringbarked, if scrub or forest land, what sort of timber was chiefly growing on the land. In

all cases a description of the neighbouring land, outcropping rocks, &c., are of great value. Also state if the land is naturally or artificially drained or not; describe the land as regards its position to hills, roads, creeks, ridges, &c. Only by adhering strictly to these instructions, and by giving minute details, benefit can be derived from the soil analyses.

WATER.

It is best to collect and forward samples of water for analysis in stoppered glass bottles, generally known as Winchester quarts.

The bottles have to be perfectly clean, and stoppers must fit well. Corks should be avoided, but if used must be new and well washed with the water before being used for closing the bottle.

When taking waters from taps, pumps, bores, the water has to be allowed to run for a while before taking the sample. When taking the water out of a well, pond, or river, the bottle is completely immersed, but care has to be taken not to disturb the mud or sediment at the bottom of the water. Before the sample is actually collected, the bottle is rinsed three times with the water, filling each time about one-third full. The bottle is then filled within about 1 inch from the top; the stopper is inserted and securely tied down with a clean piece of linen or calico.

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When taking samples of artificial manures out of bags, the sample must be taken from different bags and at different places of the bag and not only from the top, or the bags before being used are emptied on a heap and mixed up well and the sample then taken. About 1 to 2 lb. put into a clean bag should be forwarded for analysis.

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It is always important to obtain good average samples, and this can only be done by great care in taking the samples from different places, mixing well, and taking a small part of the mixture. This method would apply to any dry food-stuff—as grains of any kind, peas, beans, chaff, pollard, meal, &c. For the analysis of green foods—as green hay, sorghum, silage—it is best to make a mixture of the sample by passing it through a chaffcutter, and by taking an accurately weighed quantity—say 1 lb. This quantity may then be dried in the sun, taking care that nothing is lost, and when dry put in a bag and forwarded for analysis. The green samples may also be forwarded without drying in fruit-preserving jars.

To collect information about value of *green manures*, it is best to plot out exactly one square yard in the field covered with the plant, not picking out a position where the growth is very heavy or poor, but about a fair average. Four pegs are driven into the ground at the four corners, and string stretched between them; with a sharp spade all the plants are cut along the strings, so as to get really the growth of one square yard. The plants are all collected and accurately weighed, passed through a chaffcutter, and the sample for analysis taken as above described. In many cases the roots may be also pulled out, weighed separately, and a sample forwarded.

The samples have to be accompanied by a description of the crop—when planted, how old when cut, if the land was manured or not, weight of crop per acre or per square yard, and weight of the sample forwarded when in its green state. In the case of green manures it is generally best to take the samples at the same time when ploughed under, just after flowering.

"THE DISEASES IN PLANTS ACT OF 1896."

Department of Agriculture,

Brisbane, 11th September, 1897.

HIS Excellency the Governor, with the advice of the Executive Council, and in pursuance of the provisions of "*The Diseases in Plants Act of 1896*," has been pleased to make the following Regulations.

J. F. G. FOXTON.

REGULATIONS.

Interpretation.

1. In these Regulations, unless the context otherwise indicates, the following terms shall have and include the meanings set against them respectively, that is to say:—

"Act"—"*The Diseases in Plants Act of 1896*";

"Minister"—The Secretary for Agriculture or other Minister for the time being charged with the administration of the Act;

"Inspector"—Any Inspector appointed under the Act;

"Place of Entry"—Brisbane, Cairns, and such other place as may be appointed by the Minister;—

and words importing the singular number shall include the plural, and words importing the plural shall include the singular, and words importing the masculine gender shall include females.

Importations prohibited.

2. The importation is hereby prohibited of all trees, plants, or portion thereof, including fruit or seeds (other than those manufactured) from Ceylon, India, East Indies, East African Colonies, and all other countries in which the coffee leaf disease (*Hemeleia vastatrix*) is known to exist. Provided always that the Minister may, at his discretion, import from any of such countries coffee seed and trees, plants, vegetables, or portions thereof, all of which shall, when so imported, be suitably disinfected and detained, and grown in close quarantine for not less than twelve calendar months.

Special importations prohibited.

3. The importation is hereby prohibited of the following plants:—

(a) Sugar-cane and banana plants grown in New Guinea, Sandwich Islands, Fiji, or other country in which the beetle borer of sugar-cane (*Sphenophorus obscurus*) exists;

(b) Potatoes from Europe and America, and all other countries in which the disease caused by *Phytophthorus infestans* exists;

(c) Plants or portions of plants of all and every species of *Vitis* from Europe, Asia Minor, America, Cape of Good Hope, New South Wales, Victoria, and New Zealand, and all other countries in which *Phylloxera vastatrix* is known to exist.

Provided always that the Minister may, at his discretion, import from any of the said places any of the plants mentioned in this Regulation, all of which plants shall, when so imported, be suitably disinfected, detained, and grown as directed in the next preceding clause.

Importations.

4. Trees, plants or portions thereof that are being introduced into the colony shall be received at a place of entry and not elsewhere.

5. All parcels of trees, plants, or any portion thereof, as well as all packages that contain any such articles introduced from beyond the limits of the colony shall on their arrival be distinctly marked with the name of the place or places where the said trees or plants have been grown, and in the case of such as are being introduced, or are being transmitted through the Post Office, the nature of their contents shall in addition be similarly set forth upon them.

6. All consignees, agents, or other persons interested shall within twenty-four hours notify the Minister or some person authorised by him of the arrival of any tree or plant, or any portion thereof, from beyond the colony at a place of entry, or through the Post Office, and shall not take possession of the same or any package that may contain or have contained the same until a certificate has been issued setting forth the fact that the said articles have been inspected and disinfected or otherwise dealt with as hereinafter provided in Regulation 8.

SCHEDULE 4.

ORDER TO ERADICATE DISEASE.

I, _____, being a duly authorised person, hereby give you _____, of _____, notice that your orchard is diseased with _____, and I order you to take the following measure or measures within _____, for the eradication of such disease or diseases:—

- (a) All fallen fruit of whatever kind (and whether harbouring insects or not) shall be gathered before noon of each day and all pest-infested fruit shall be submitted to the process of boiling or be buried beneath not less than one foot six inches of solid earth:
- (b) The trees shall be sprayed with one of the following mixtures (*the number of sprayings and intervals between sprayings to be stated*):—

1.—*Resin wash for scale insects.*

Take 20 lb. of resin, 6 lb. of caustic soda (70 per cent.), 3 pints of fish oil, water to make 80 gallons. Place the resin, caustic soda, and fish oil in a large boiler with 20 gallons of water, and boil for three hours, then add hot water slowly and stir well till there are at least 40 gallons of hot solution; then add cold water to make up the total to 80 gallons. Never add cold water when cooking or the resin will be precipitated, and it will be difficult to get it in solution. The above is the strength to use for citrus trees; a winter wash for deciduous trees may be used one-half stronger, the total amount being made up to 54 gallons instead of 80 gallons.

2.—*Sulphur, lime, and salt wash.*

Take 40 lb. of unslacked lime, 20 lb. of sulphur, 15 lb. of salt, and 50 gallons of water.

To mix take 10 lb. of lime, 20 lb. of sulphur, and 20 gallons of water; boil for not less than one hour and a-half, or until the sulphur is thoroughly dissolved, when the mixture will be of a light-amber colour. Slack 30 lb. of lime in a barrel with hot water, and when thoroughly slacked, but still boiling, add the 15 lb. of salt; when this is dissolved, the whole should be added to the lime and sulphur in the boiler, and the whole boiled for half-an-hour longer, when water to make the whole up to 50 gallons should be added. Strain through a wire sieve, and keep well stirred whilst in use.

3.—*Bordeaux mixture.*

Winter strength—6 lb. bluestone, 4 lb. of unslacked lime, 22 gallons of water.

Summer strength—6 lb. bluestone, 4 lb. of unslacked lime, 40 gallons of water.

Prepare as follows (for the 40 gallons solution, the 22 gallons solution in proportion):—

(1.) Dissolve 6 lb. of bluestone in 20 gallons of cold water in one cask, by placing it in a bag and suspending it in the water.

(2.) Slack 4 lb. of unslacked lime in another cask slowly by first pouring about 3 pints of water over it. This will reduce the lime to a thick cream, free from lumps. Water should now be added, stirring well till there is 20 gallons of milk of lime in the cask.

(3.) Stir the milk of lime up well, strain it, and pour the whole of the 20 gallons of milk of lime and the 20 gallons of bluestone water together slowly into a third cask, stir well for three minutes, and if properly made the mixture is fit for use.

4.—Any other mixture, particulars to be filled in by a duly authorised person.

5.—Fumigation with hydrocyanic acid gas, particulars to be filled in by a duly authorised person.

SCHEDULE 5.

This is to certify that [I or we] have duly registered [my or our] nursery situated at _____, and that [I or we] have disinfected the plants or trees sold this day to _____, of _____, by one or other of the methods prescribed by Schedule 1 of the Regulations under "*The Diseases in Plants Act of 1896*," and that the said trees or plants are free from disease and are in a healthy and vigorous condition.

Signed:

Date:

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GOVERNMENT AGRICULTURAL LABORATORY.

INSTRUCTION FOR THE COLLECTION OF SAMPLES, AND SCALE OF FEES.

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2. Should a customer wish for an immediate analysis, the fee, as provided by scale of fees below, will be increased by 50 per cent.

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SCALE OF FEES.

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						£	s.	d.
Soil—Short analysis (estimation of	lime,	alkalies,						
nitrogen, and phosphoric acid)	...	...	...	...	...	2	2	0
Soil and Subsoil—Short analysis	...	...	...	...	...	3	3	0
Soil—Complete analysis	...	...	...	...	...	4	4	0
Water—Analysis	...	...	...	...	...	3	3	0
Manures—								
Complete analysis	...	...	...	...	...	2	2	0
Nitrogen only	...	...	...	...	...	0	7	6
Potash only	...	...	...	...	...	0	7	6
Phosphoric acid sol.	...	...	...	...	...	0	15	0
Phosphoric acid insol.	...	...	...	...	...	0	15	0
Food Stuff—								
Complete analysis	...	...	...	...	...	2	2	0
Water only	...	...	...	...	...	0	5	0
Albuminoids	...	...	...	...	...	0	10	0
Oil or fat	...	...	...	...	...	0	7	6
Ash	...	...	...	...	...	0	5	0
Fibre	...	...	...	...	...	0	7	6
Sugar-cane, sugar-beet, megass—Analysis of	...	...	...	...	...	1	1	0
Sugar, massecuite, jelly, molasses	...	...	...	...	...	1	1	0
Milk, butter, cheese—Complete analysis	...	...	...	...	...	1	0	0
Tanning materials (tannin estim.)	...	...	...	...	...	1	0	0
Soaps	...	...	...	...	...	1	10	0
Limestone, cement, clay, &c....	...	...	...	...	...	3	0	0

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THE LABORATORY AT THE QUEENSLAND AGRICULTURAL COLLEGE.

THE accompanying plates, which were unfortunately not ready for the last number of the *Journal*, in which Mr. Brünnich's article appeared, will give a very clear notion of the interior arrangement of the students' laboratory. The photographs were taken by Mr. Brünnich himself, notwithstanding the fact that in one of the illustrations he appears seated at the lecturer's platform. We would suggest to recipients of the *Journal* who get their numbers bound, that these illustrations be then placed in their proper position with the accompanying article.

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To collect information about value of *green manures*, it is best to plot out exactly one square yard in the field covered with the plant, not picking out a position where the growth is very heavy or poor, but about a fair average. Four pegs are driven into the ground at the four corners, and string stretched between them; with a sharp spade all the plants are cut along the strings, so as to get really the growth of one square yard. The plants are all collected and accurately weighed, passed through a chaffcutter, and the sample for analysis taken as above described. In many cases the roots may be also pulled out, weighed separately, and a sample forwarded.

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Public Announcements.

THE Editor will be glad to receive any papers of special merit which may be read at meetings of Agricultural and Pastoral Associations in Queensland, reserving, however, the right to decide whether their value and importance will justify their publication.

THE *Queensland Agricultural Journal* will be supplied to all members of Agricultural and Horticultural Societies who do not derive their livelihood solely from the land, on payment, in advance, of an annual subscription of 5s.

GOVERNMENT AGRICULTURAL LABORATORY.

INSTRUCTION FOR THE COLLECTION OF SAMPLES, AND SCALE OF FEES.

GENERAL INSTRUCTIONS.

1. All analyses are carried out in their turn as they arrive at the Laboratory.
2. Should a customer wish for an immediate analysis, the fee, as provided by scale of fees below, will be increased by 50 per cent.
3. The samples may be forwarded by parcel post or by rail, either to the Under Secretary for Agriculture, Brisbane, or direct to the Chemist, Agricultural Laboratory, at the Agricultural College, Gatton; but in any case the required fee must be transmitted at the same time.
4. Analyses will be only carried out, if samples are taken strictly in accordance with the instructions issued below.

SCALE OF FEES.

						Farmers, Selectors, Gardeners.		
						£	s.	d.
Soil—Short analysis (estimation of	lime,	alkalies,				2	2	0
nitrogen, and phosphoric acid)	...	...	...	...	...	2	2	0
Soil and Subsoil—Short analysis	...	...	...	...	...	3	3	0
Soil—Complete analysis	...	...	...	...	...	4	4	0
Water—Analysis	...	...	...	...	...	3	3	0
Manures—								
Complete analysis	...	...	...	...	...	2	2	0
Nitrogen only	...	...	...	...	...	0	7	6
Potash only	...	...	...	...	...	0	7	6
Phosphoric acid sol.	...	...	...	...	...	0	15	0
Phosphoric acid insol.	...	...	...	...	...	0	15	0
Food Stuffs—								
Complete analysis	...	...	...	...	...	2	2	0
Water only	...	...	...	...	...	0	5	0
Albuminoids	...	...	...	...	...	0	10	0
Oil or fat	...	...	...	...	...	0	7	6
Ash	...	...	...	...	...	0	5	0
Fibre	...	...	...	...	...	0	7	6
Sugar-cane, sugar-beet, megass—Analysis of	...	...	...	...	...	1	1	0
Sugar, massecuite, jelly, molasses	...	...	...	...	...	1	1	0
Milk, butter, cheese—Complete analysis	...	...	...	...	...	1	0	0
Tanning materials (tannin estim.)	...	...	...	...	...	1	0	0
Soaps	...	...	...	...	...	1	10	0
Limestone, cement, clay, &c....	...	...	...	...	...	3	0	0

INSTRUCTIONS FOR TAKING AND COLLECTING OF SAMPLES.

SOILS AND SUBSOILS.

To obtain a fair average sample of the soil of a block of land, as near as possible, equal quantities of soil are taken from various parts of the fields.

A sketch plan of the field, paddock, or block of land on which the samples were taken should accompany the samples, and the spots where samples are taken are marked on this plan and numbered. This sketch plan should also indicate position of roads, creeks, gullies, ridges, general fall of the land, &c.

Should the soil in various parts of the block show a very marked difference, it will be necessary to divide the block into two, rarely in more, parts. Should the different soil occur only in a small patch, this sample may be left out.

Not less than three samples should be taken in each section. A greater number is to be preferred, as a better average will be obtained.

At the places chosen for the taking of the samples the surface is slightly scraped with a sharp tool, to remove any surface vegetation which has not as yet become part of the soil.

Vertical holes from 10 to 18 inches square are dug in the ground to a depth of 2 feet 6 inches to 3 feet.

The holes are dug out like post-holes; an earth-auger facilitates the operation considerably, and the holes may be trimmed with the spade afterwards.

Careful note of the appearance of the freshly cut soil and subsoil should be taken. The depth of the real soil, which in most cases is easily distinguished, is also measured and noted for each hole. Note how deep the roots of the surface vegetation reach into the soil. If the soil changes gradually into the subsoil, as is the case in some places where the soil is of very great depth, this line of division is guessed approximately, or it is best to take the soil uniformly to a depth of 12 inches.

With a spade a slice of soil is now cut off and put on to a clean bag. The same is done with the subsoil, and the slice is taken from where the soil ends (or 12 inches) to the bottom of the hole, and this subsoil placed on another bag. Stones over the size of a pea may be picked out, the rough quantity of such stones estimated, and a few enclosed with the samples. Fine roots must not be taken out from the soil samples. The same operation is repeated at the other places chosen. Careful note and description in each hole, as numbered and marked on plan given, and the samples of soil collected on the one bag thoroughly mixed by breaking up any large clods, and about 10 lb. of the mixture put into a clean canvas bag, which is securely tied up and labelled. The same is done with the samples of subsoil collected on the other bag.

All the samples collected are afterwards placed into a wooden box.

It is important to use clean bags and clean boxes, and also that the samples should not be left in the neighbourhood of stables or manure heaps. A short description of the land must accompany the samples and the sketch plan.

In the case of cultivated land, state how long the land was under cultivation, what crops were chiefly grown, result of such crops, was any manure applied, when, and what sort, and in what quantities per acre. In the case of virgin soil, state if the land was heavily timbered or not, ringbarked, if scrub or forest land, what sort of timber was chiefly growing on the land. In all cases a description of the neighbouring land, outcropping rocks, &c., are of great value. Also state if the land is naturally or artificially drained or not; describe the land as regards its position to hills, roads, creeks, ridges, &c. Only by adhering strictly to these instructions, and by giving minute details, benefit can be derived from the soil analyses.

WATER.

It is best to collect and forward samples of water for analysis in stoppered glass bottles, generally known as Winchester quarts.

The bottles have to be perfectly clean, and stoppers must fit well. Corks should be avoided, but if used must be new and well washed with the water before being used for closing the bottle.

When taking waters from taps, pumps, bores, the water has to be allowed to run for a while before taking the sample. When taking the water out of a well, pond, or river, the bottle is completely immersed, but care has to be taken not to disturb the mud or sediment at the bottom of the water. Before the sample is actually collected, the bottle is rinsed three times with the water, filling each time about one-third full. The bottle is then filled within about 1 inch from the top; the stopper is inserted and securely tied down with a clean piece of linen or calico.

The stopper must not be fastened or luted with sealing-wax, paste, plaster of paris, &c.

MANURES.

When taking samples of artificial manures out of bags, the sample must be taken from different bags and at different places of the bag and not only from the top, or the bags before being used are emptied on a heap and mixed up well and the sample then taken. About 1 to 2 lb. put into a clean bag should be forwarded for analysis.

FOOD STUFFS.

It is always important to obtain good average samples, and this can only be done by great care in taking the samples from different places, mixing well, and taking a small part of the mixture. This method would apply to any dry food-stuff—as grains of any kind, peas, beans, chaff, pollard, meal, &c. For the analysis of green foods—as green hay, sorghum, silage—it is best to make a mixture of the sample by passing it through a chaffcutter, and by taking an accurately weighed quantity—say 1 lb. This quantity may then be dried in the sun, taking care that nothing is lost, and when dry put in a bag and forwarded for analysis. The green samples may also be forwarded without drying in fruit-preserving jars.

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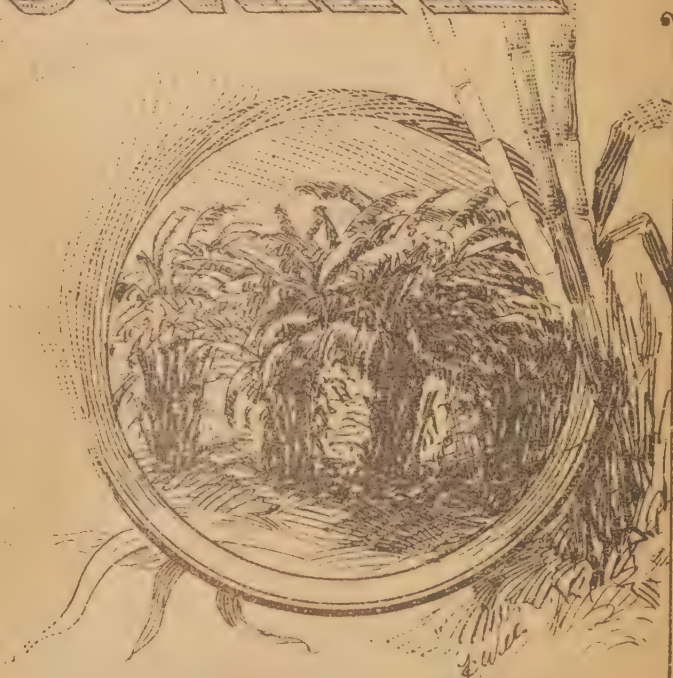
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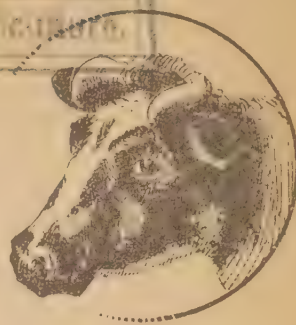
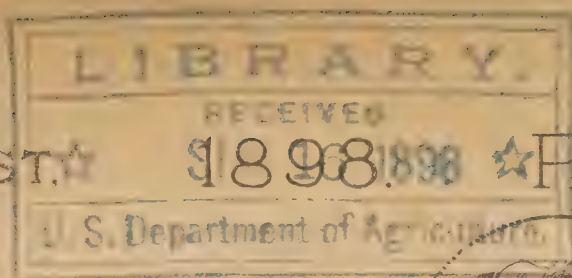


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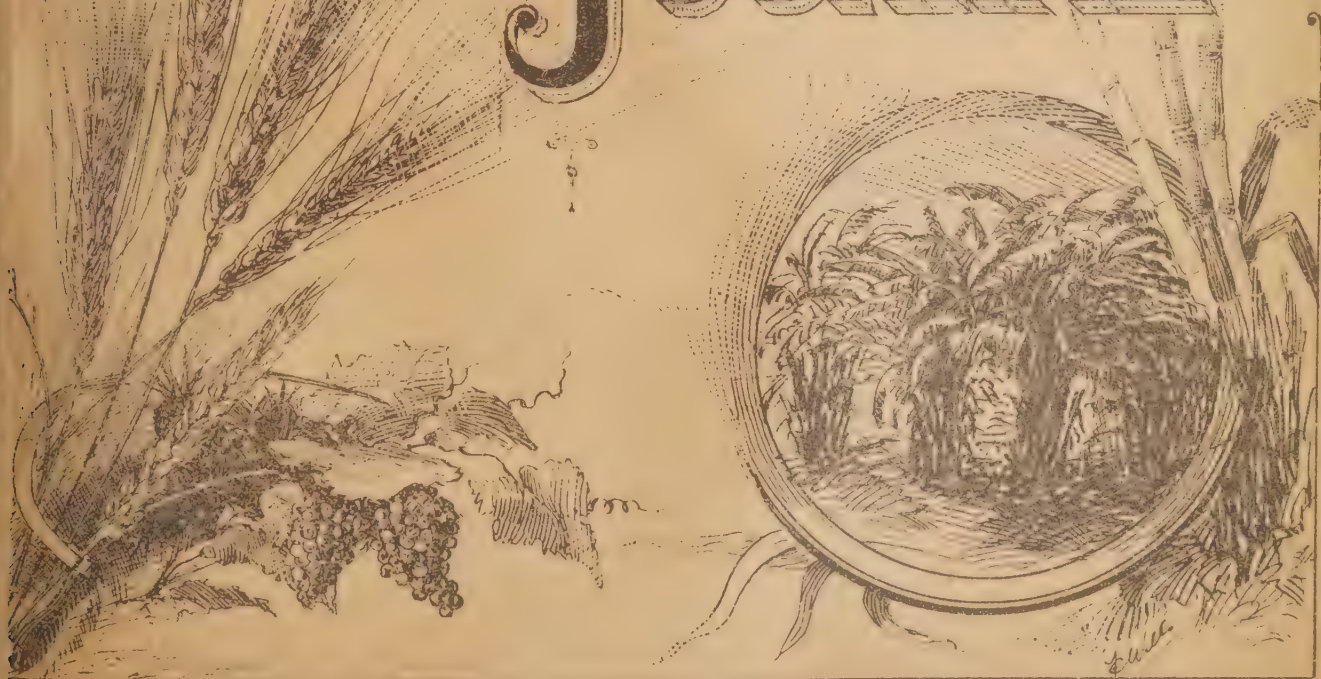
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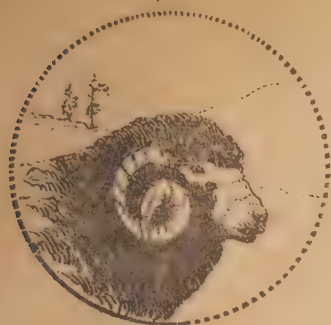
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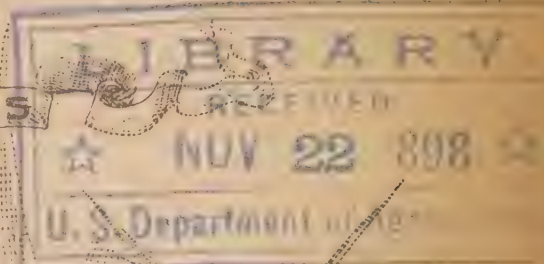
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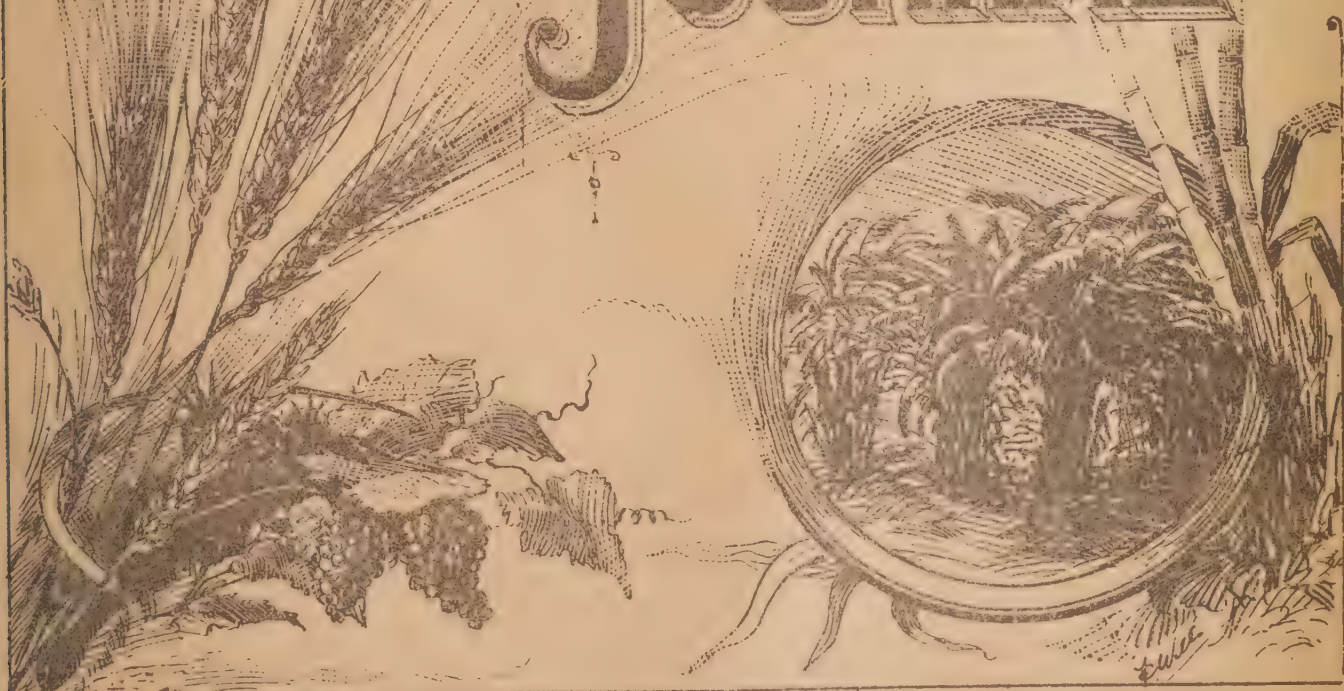


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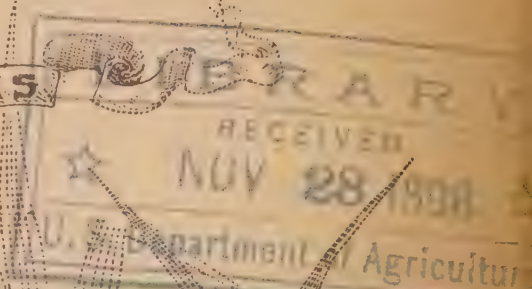
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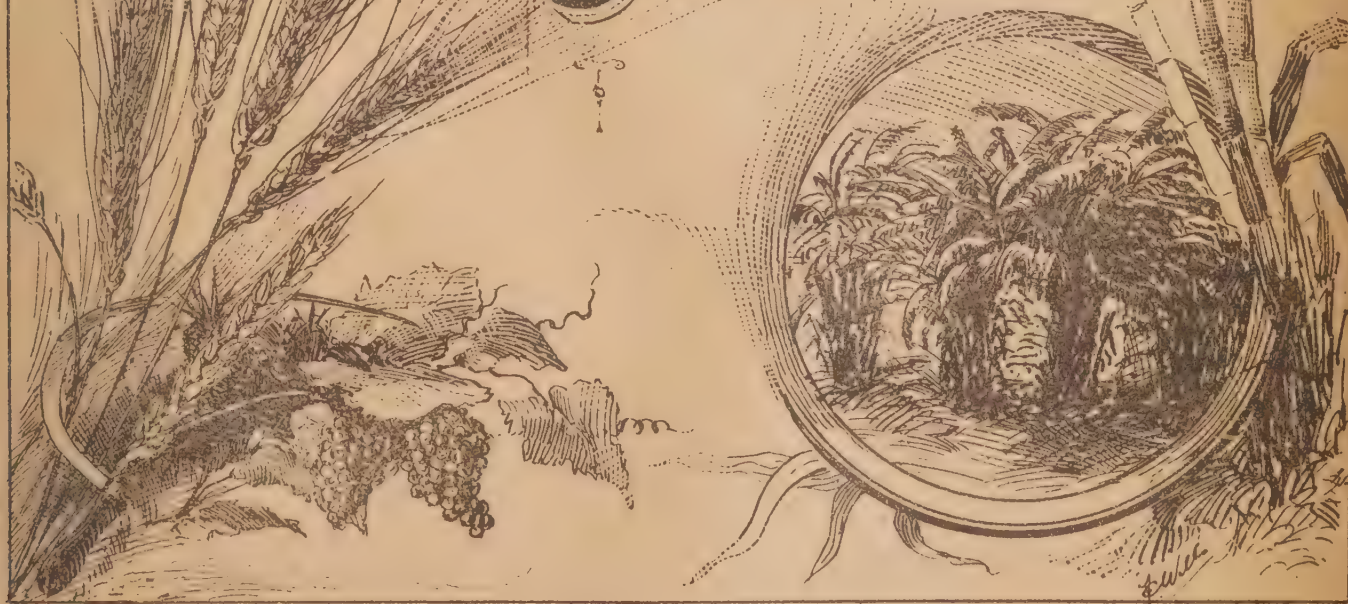


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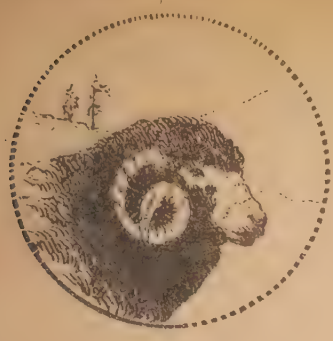
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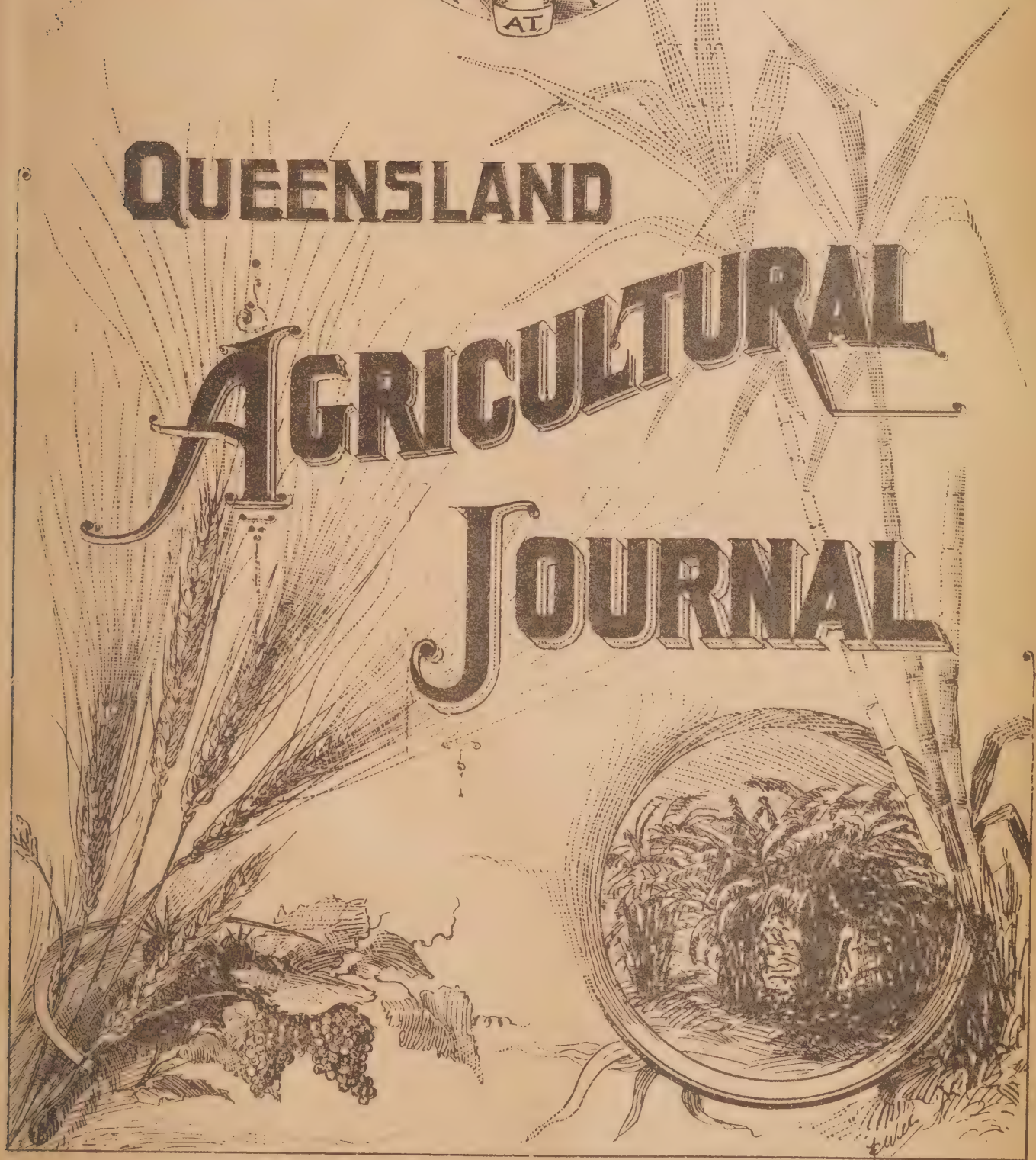
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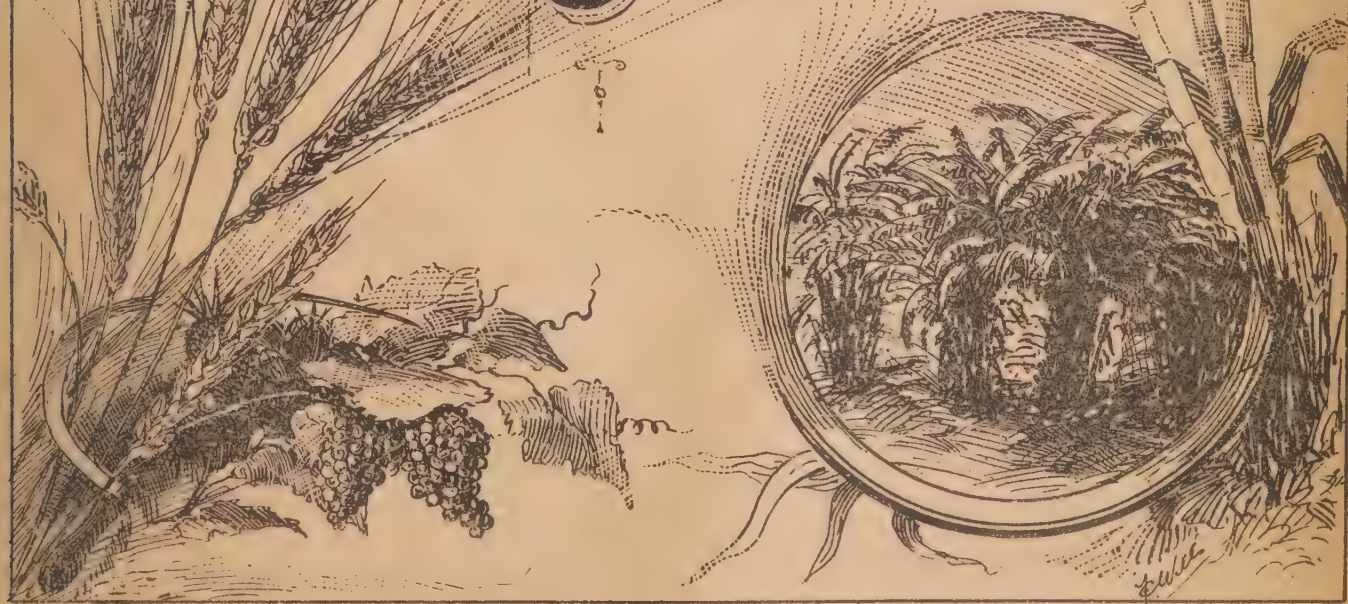
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